

2024-1038

United States Court of Appeals
for the Federal Circuit

In re: GESTURE TECHNOLOGY PARTNERS, LLC,
Appellant,

Appeal from the United States Patent and Trademark Office in
Ex parte Reexamination Control No. 90/014,903

OPENING BRIEF OF APPELLANT
GESTURE TECHNOLOGY PARTNERS, LLC

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March 21, 2024

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PATENT CLAIMS AT ISSUE

Claims 8-18 of U.S. Patent No. 8,878,949 are the patent claims at issue.

8. A computer implemented method comprising:

providing a portable device including a forward facing portion encompassing a digital camera and an electro-optical sensor, the electro-optical sensor having an output and defining a field of view;

determining, using a processing unit, a gesture has been performed in the electro-optical sensor field of view based on the electro-optical sensor output, wherein the determined gesture corresponds to an image capture command; and

capturing an image to the digital camera in response to the determined gesture corresponding to the image capture command.
9. The method according to claim 8 wherein the determined gesture includes a hand motion.
10. The method according to claim 8 wherein the determined gesture includes a pose.
11. The method according to claim 8 wherein the electro-optical sensor includes first and second sensors in fixed relation relative to the digital camera.
12. The method according to claim 8 wherein the electro-optical sensor defines a resolution less than a resolution defined by the digital camera.
13. An image capture device comprising:

a device housing including a forward facing portion, the forwarding facing portion encompassing a digital camera adapted to capture an image and having a field of view and encompassing a sensor adapted to detect a gesture in the digital camera field of view; and

a processing unit operatively coupled to the sensor and to the digital camera, wherein the processing unit is adapted to:

detect a gesture has been performed in the electro-optical sensor field of view based on an output of the electro-optical sensor, and

correlate the gesture detected by the sensor with an image capture function and subsequently capture an image using the digital camera, wherein the detected gesture is identified by the processing unit apart from a plurality of gestures.

14. The image capture device of claim 13 wherein the detected gesture includes a hand motion.
15. The image capture device of claim 13 wherein the detected gesture includes a pose.
16. The image capture device of claim 13 further including a forward facing light source.
17. The image capture device of claim 13 wherein the sensor defines a resolution less than a resolution defined by the digital camera.
18. The image capture device of claim 13 wherein the sensor is fixed in relation to the digital camera.

FORM 9. Certificate of Interest

Form 9 (p. 1)
March 2023

**UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT**

CERTIFICATE OF INTEREST

Case Number 2024-1038

Short Case Caption In re: Gesture Technology Partners, LLC

Filing Party/Entity Gesture Technology Partners, LLC

Instructions:

1. Complete each section of the form and select none or N/A if appropriate.
2. Please enter only one item per box; attach additional pages as needed, and check the box to indicate such pages are attached.
3. In answering Sections 2 and 3, be specific as to which represented entities the answers apply; lack of specificity may result in non-compliance.
4. Please do not duplicate entries within Section 5.
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I certify the following information and any attached sheets are accurate and complete to the best of my knowledge.

Date: 03/21/2024

Signature: /s/ Fred I. Williams

Name: Fred I. Williams

FORM 9. Certificate of Interest

Form 9 (p. 2)
March 2023

1. Represented Entities. <u>Fed. Cir. R. 47.4(a)(1).</u>	2. Real Party in Interest. <u>Fed. Cir. R. 47.4(a)(2).</u>	3. Parent Corporations and Stockholders. <u>Fed. Cir. R. 47.4(a)(3).</u>
Provide the full names of all entities represented by undersigned counsel in this case.	Provide the full names of all real parties in interest for the entities. Do not list the real parties if they are the same as the entities. <input checked="" type="checkbox"/> None/Not Applicable	Provide the full names of all parent corporations for the entities and all publicly held companies that own 10% or more stock in the entities. <input checked="" type="checkbox"/> None/Not Applicable
Gesture Technology Partners, LLC		

☐ Additional pages attached

FORM 9. Certificate of Interest

Form 9 (p. 3)
March 2023

4. Legal Representatives. List all law firms, partners, and associates that (a) appeared for the entities in the originating court or agency or (b) are expected to appear in this court for the entities. Do not include those who have already entered an appearance in this court. [Fed. Cir. R. 47.4\(a\)\(4\)](#).

☒ None/Not Applicable ☐ Additional pages attached

5. Related Cases. Other than the originating case(s) for this case, are there related or prior cases that meet the criteria under [Fed. Cir. R. 47.5\(a\)](#)?

☒ Yes (file separate notice; see below) ☐ No ☐ N/A (amicus/movant)

If yes, concurrently file a separate Notice of Related Case Information that complies with [Fed. Cir. R. 47.5\(b\)](#). **Please do not duplicate information.** This separate Notice must only be filed with the first Certificate of Interest or, subsequently, if information changes during the pendency of the appeal. [Fed. Cir. R. 47.5\(b\)](#).

6. Organizational Victims and Bankruptcy Cases. Provide any information required under [Fed. R. App. P. 26.1\(b\)](#) (organizational victims in criminal cases) and 26.1(c) (bankruptcy case debtors and trustees). [Fed. Cir. R. 47.4\(a\)\(6\)](#).

☒ None/Not Applicable ☐ Additional pages attached

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I. STATEMENT OF RELATED CASES

Pursuant to Federal Circuit Rule 47.5, Appellant Gesture Technology Partners, LLC (“GTP”) states that no other appeal in or from the same proceeding in the originating tribunal was previously before this or any other appellate court.

Cases pending in this or any other court which will directly affect or be directly affected by this Court’s decision in the pending appeal are listed below.

- *Apple Inc., v. Gesture Technology Partners, LLC*, 2023-1501 (Court of Appeals for the Federal Circuit)
- *Gesture Technology Partners, LLC v. Apple Inc.*, 4:22-cv-04806-YGR (U.S. District Court for the Northern District of California)
- *Gesture Technology Partners, LLC v. Motorola Mobility LLC*, 1:22-cv-03535 (U.S. District Court for the Northern District of Illinois)
- *Gesture Technology Partners, LLC v. LG Electronics Inc. et al.*, 2:21-cv-19234-EP-MAH (U.S. District Court for the District of New Jersey)

II. JURISDICTIONAL STATEMENT

Pursuant to [35 U.S.C. § 6\(b\)](#), the Patent Trial and Appeal Board (the “Board”) issued its Decision on Appeal on August 8, 2023 (the “Decision”). [Appx0001-0029](#). Patent Owner timely filed a Notice of Appeal on October 6, 2023. [Appx0740-0742](#). This Court has jurisdiction pursuant to [28 U.S.C. §1295\(a\)\(4\)\(A\)](#) and [35 U.S.C. § 141\(b\)](#).

III. STATEMENT OF THE ISSUES

1. Whether the claim term “processing unit” in claim 13 invokes [35 U.S.C. § 112](#), ¶6?

2. Whether U.S. Patent No. 6,115,482 (“*Sears*”) renders obvious claims 8-18 of U.S. Patent No. 8,878,949?
3. Whether a substantial new question of patentability exists to order *ex parte* reexamination?
4. Whether the USPTO has jurisdiction over expired patents?

IV. STATEMENT OF THE CASE AND FACTS

A. Procedural Background

This appeal involves one patent owned by GTP: U.S. Patent No. 8,878,949 (the “’949 Patent”). The ’949 Patent was filed on August 7, 2013, as U.S. Patent Application No. 13/961,452. [Appx0031](#). The ’949 Patent issued on November 4, 2014. *Id.* The ’949 Patent claims priority to several patent applications, including U.S. Provisional Patent Application No. 60/133,671, which was filed on May 11, 1999. [Appx0031](#). The ’949 Patent expired in May 2020. *See* [Appx0031](#), [Appx0702](#).

Samsung Electronics Co., Ltd. filed a request for *ex parte* reexamination of the ’949 Patent on November 11, 2021. [Appx0048-0105](#). The USPTO issued an order granting *ex parte* reexamination of the ’949 Patent on December 2, 2021 (the “Reexam Order”). [Appx0592-0599](#).

During the reexamination proceeding, the Examiner issued a Final Office Action on June 9, 2022 (the “Final OA”), rejecting claims 8-18 of the ’949 Patent. [Appx0637-0661](#). Appellant filed a Notice of Appeal pursuant to [35 U.S.C. §§ 134 and 306](#) on August 9, 2022 (*see* [Appx0662-0663](#)), and then filed an Appeal Brief

pursuant to [37 C.F.R. § 41.37](#) on October 11, 2022 (“Appeal Br.”). [Appx0664-0708](#). The Examiner issued an Answer on January 11, 2023 (“Answer”) ([Appx0709-0722](#)), and Appellant filed a Reply Brief pursuant to [37 C.F.R. § 41.41](#) on March 13, 2023. *See* [Appx0723-0739](#).

On August 8, 2023, the Board issued its Decision on Appeal (the “Decision”). [Appx0001-0029](#). The Board affirmed the Examiner’s rejections of claims 8-18 of the ’949 Patent. [Appx0028](#) (Decision, p. 27).

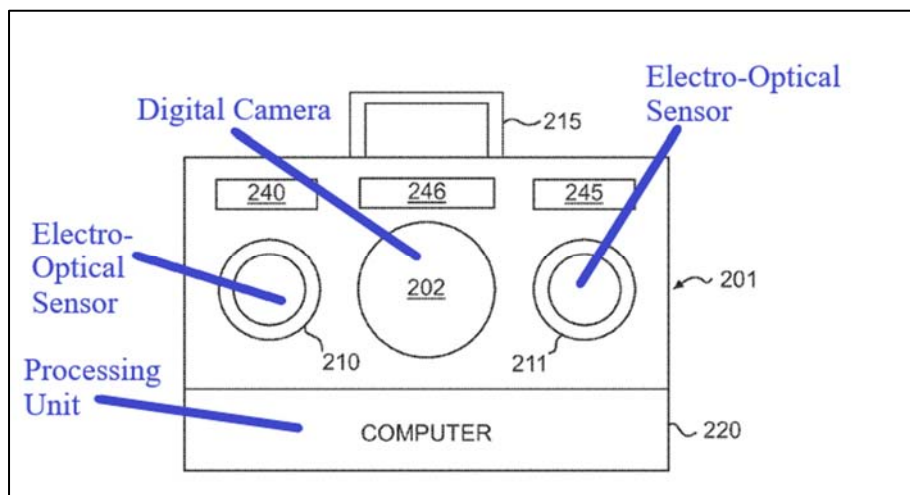
Claim(s) Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
8–18	103	Sears	8–18	
Overall Outcome			8–18	

Id. Pursuant to [28 U.S.C. § 1295\(a\)\(4\)\(A\)](#) and [35 U.S.C. § 141\(b\)](#), a Notice of Appeal was filed with this Court on October 6, 2023. [Appx0740-0742](#).

B. Subject Matter of the ’949 Patent

The ’949 Patent is titled “Camera based interaction and instruction.” [Appx0031](#). The ’949 Patent is directed to an image capture device. *See, e.g.*, [Appx0041-0042](#) (’949 Patent, 3:29-60, 4:66-5:49, 6:23-29), [Appx0044](#) (’949 Patent, 9:60-10:30), [Appx0047](#) (’949 Patent, 16:23-40), [Appx0033](#) (’949 Patent, Fig. 1), [Appx0034](#) (’949 Patent, Fig. 2A), [Appx0035](#) (’949 Patent, Fig. 2C), [Appx0037](#) (’949 Patent, Fig. 5). The image capture device includes a device housing with a

forward facing portion encompassing both a digital camera and an electro-optical sensor. *See id.* Figure 2A of the '949 Patent is reproduced below:



[Appx0034](#) ('949 Patent, Fig. 2A) (annotated). The image capture device also includes a processing unit adapted to detect a gesture performed in the sensor's field of view, correlate the gesture with an image capture function, and subsequently capture an image using the digital camera. *See, e.g.,* [Appx0041-0042](#) ('949 Patent, 3:29-60, 4:66-5:49, 6:23-29), [Appx0044](#) ('949 Patent, 9:60-10:30), [Appx0047](#) ('949 Patent, 16:23-40), [Appx0033](#) ('949 Patent, Fig. 1), [Appx0034](#) ('949 Patent, Fig. 2A), [Appx0035](#) ('949 Patent, Fig. 2C), [Appx0037](#) ('949 Patent, Fig. 5).

C. The Board's Decision On Appeal

The Final OA asserted one ground of unpatentability based on a single prior art reference: obviousness of claims 8-18 in view of U.S. Patent No. 6,115,482 ("Sears"). *See* [Appx0642-0648](#) (Final OA, pp. 5-11).

In its Decision, the Board affirmed the Examiner's rejections and mainly adopted the Examiner's positions and reasoning: "we adopt as our own (1) the findings and reasons set forth by the Examiner in the [Final OA] from which this appeal is taken and (2) the reasons set forth by the Examiner in the Examiner's Answer." [Appx0007](#) (Decision, p. 6). The Board's findings and determinations are summarized immediately below.

First, the Board incorrectly determined that the term "processing unit" in claim 13 invokes [35 U.S.C. § 112, ¶6](#). See [Appx0640-0642](#) (Final OA, pp. 3-5). In doing so, the Board improperly gave insufficient weight to both how a POSITA would understand the term and the relevant case law.

Second, the Board incorrectly determined that *Sears* teaches or suggests a single portion of "device housing" encompassing both a digital camera and a sensor, as claim 13 requires. See [Appx0017](#) (Decision, p. 16). The Board's determination is cut from whole cloth because neither the shape nor geometry of the "device housing" is shown or described in *Sears*. See *id.*

Third, the Board incorrectly determined that *Sears* teaches or suggests that the single "portion" of the "device housing" is a "forward facing portion," as claim 13 requires. See [Appx0016-0017](#) (Decision, pp. 15-16). In doing so, the Board improperly gave insufficient weight to both how a POSITA would understand the term "forward facing" and the specification of the '949 Patent.

Fourth, the Board incorrectly determined that *Sears* teaches or suggests the “processing unit” of claim 13 even though neither the corresponding structure nor an equivalent is found in *Sears*. See [Appx0019-0020](#) (Decision, pp. 18-19).

Fifth, to make a finding that *Sears* is analogous art, the Board improperly excluded “electronic reading machines” from *Sears*’ field of endeavor and improperly characterized the problem being solved by the ’949 Patent. See [Appx0008-0014](#) (Decision, pp. 7-13).

Sixth, the Board incorrectly determined that the “pose” of dependent claim 15 may involve just a hand and does not require another body part. See [Appx0021-0022](#) (Decision, pp. 20-21). In doing so, the Board violated the canons of claim construction and improperly gave more weight to extrinsic evidence than to the specification of the ’949 Patent. See *id.*

Seventh, the Board incorrectly found that *Sears* teaches or suggests “the sensor is fixed in relation to the digital camera” requirement of dependent claim 18 by combining two different embodiments in *Sears*. See [Appx0024-0025](#) (Decision, pp. 23-24). But the Board provided no articulated reasoning for the combination. See *id.*

Eighth, the Board incorrectly determined that the USPTO has jurisdiction over expired patents. See [Appx0025-0027](#) (Decision, pp. 24-26). But the Board did not

consider the *Oil States* case from the Supreme Court in reaching that conclusion. *See id.*

V. SUMMARY OF THE ARGUMENT

The Board’s decision affirming the Examiner’s obviousness rejections is defective for multiple reasons. *Sears* teaches that its two cameras may be “placed within a common housing.” Despite *Sears* neither showing nor describing the shape or geometry of the “common housing,” the Board inexplicably determined that a single portion of *Sears*’ “common housing” encompasses both cameras, as the independent claims require. The Board also improperly determined that a “downward” facing portion of the “common housing” satisfies the “forward facing portion” claim requirement when both the specification and an expert declaration make it clear that a POSITA would not consider forward facing and downwards facing to be coextensive. Further, the Board improperly determined that *Sears* teaches a gesture that triggers image capture, as the independent claims require, because the gestures in *Sears* control interpretation via OCR and vocalization, but not image capture.

Regarding dependent claims 10 and 15, the Board improperly determined that the claimed “pose” may consist of a single hand when at least one canon of claim construction and the specification mandate otherwise. Further, in an attempt to meet

the requirements of dependent claims 4 and 18, the Board combined two disparate embodiments in *Sears*, but provided no articulated reasoning for doing so.

Finally, the USPTO does not have jurisdiction over expired patents and, therefore, the Board's decision should be vacated.

VI. STANDARD OF REVIEW

“Claim construction is ultimately a question of law, decided *de novo* on review, as are the intrinsic-evidence aspects of a claim-construction analysis. But we review any underlying fact findings about extrinsic evidence, such as extra-patent usage, for substantial-evidence support when the appeal comes from the Board.” *IntelCorp. v. Qualcomm Inc.*, [21 F.4th 801, 808](#) (Fed. Cir. 2021) (cleaned up). The Board's decision may be vacated and remanded to the Board to consider the patentability grounds under the proper construction. *In re Abbott Diabetes Care, Inc.*, [696 F.3d 1142, 1150](#) (Fed. Cir. 2012).

“Obviousness is a mixed question of law and fact, and we review the Board's ultimate obviousness determination *de novo* and underlying fact-findings for substantial evidence.” *Mylan Pharms. Inc. v. Merck Sharp & Dohme Corp.*, [50 F.4th 147, 152](#) (Fed. Cir. 2022) (cleaned up). Obviousness determinations that are based on an improper construction should be vacated. *In re Man Mach. Interface Techs. LLC*, [822 F.3d 1282, 1288-89](#) (Fed. Cir. 2016). “What a reference teaches and whether it teaches toward or away from the claimed invention are questions of fact.”

Par Pharm., Inc. v. TWi Pharms., Inc., [773 F.3d 1186, 1196-97](#) (Fed. Cir. 2014) (cleaned up). The Board’s determination that a prior art reference is analogous art presents an issue of fact, reviewed for substantial evidence. *In re Klein*, [647 F.3d 1343, 1347](#) (Fed. Cir. 2011).

“The ultimate question of whether the reexamination is based on a substantial new question of patentability remains a question of law.” *In re Vivint, Inc.*, [14 F.4th 1342, 1348](#) (Fed. Cir. 2021) (cleaned up).

VII. ARGUMENT

A. The Board Improperly Construed The Term “Processing Unit” In Claim 13.

The Board/Examiner contends that the term “processing unit” in claim 13 invokes [35 U.S.C. § 112, ¶6](#). See [Appx0639-0642](#) (Final OA, pp. 2-5); [Appx0712-0713](#) (Answer, pp. 3-4). Appellant disagrees.

Claim 13 recites an “image capture device” comprising a “device housing” encompassing a “digital camera” and a “sensor.” [Appx0047](#) (’949 Patent, 16:23-40). Claim 13 further recites “a processing unit operatively coupled to the sensor and to the digital camera.” *Id.* A POSITA would understand that both limitations describe the physical relationship and connections between the recited components of the claimed “image capture device.” See [Appx0616-0617](#) (Occhiogrosso Decl., ¶¶ 44-46).

As a threshold matter, the term “processing unit” does not contain the words “means” or “step for,” so it is presumed to not be a means-plus-function term. *Williamson v. Citrix Online, LLC*, [792 F.3d 1339, 1348](#) (Fed. Cir. 2015) (en banc). Further, the question of whether the term “processing unit” invokes § 112, ¶6, depends on whether a POSITA “would understand the claim language to refer to structure, assessed in light of the presumption that flows from the drafter’s choice not to employ the word ‘means.’” *Samsung Elecs. Am., Inc. v. Prisia Eng’g Corp.*, [948 F.3d 1342, 1354](#) (Fed. Cir. 2020).

The term “processing unit” recites sufficient structure to a POSITA such that they would understand that “processing unit” is a microprocessor, computer, or central processing unit. See [Appx0616-0617](#) (Occhiogrosso Decl., ¶¶ 44-46). The Board/Examiner provides no evidence that a POSITA would regard the term “processing unit” as purely functional. See [Appx0639-0642](#) (Final OA, pp. 2-5), [Appx0712-0713](#) (Answer, pp. 3, 4). Indeed, a POSITA would understand that the claimed “processing unit” is not being functionally claimed. See [Appx0616-0617](#) (Occhiogrosso Decl., ¶¶ 44-46). The claim states that “wherein the processing unit is adapted to: [1] detect a gesture has been performed in the electro-optical sensor field of view based on an output of the electro-optical sensor and [2] correlate the gesture detected by the sensor with an image capture function and subsequently capture an image using the digital camera, wherein the detected gesture is identified

by the processing unit apart from a plurality of gestures.” That language is not functional but structural. *Id.* Thus, “processing unit” in claim 13 does not invoke [35 U.S.C. § 112, ¶6](#).

The United States District Court for the Eastern District of Texas determined that the term “processing unit” in claim 13 of the ’949 Patent does not invoke [35 U.S.C. § 112, ¶6](#). See [Appx0582-0589](#) (*Gesture Technology Partners, LLC v. Huawei Device Co.*, 2:20-cv-00040, Dkt. 93, pp. 79-86 (E.D. Tex. Oct. 12, 2021)). That court relied on this Court’s decision in *Samsung Elecs. Am, Inc.*, which held that “the term ‘digital processing unit’ clearly serves as a stand-in for a ‘general purpose computer’ or a ‘central processing unit,’ each of which would be understood as a reference to structure in this case, not simply any device that can perform a particular function.” *Samsung Elecs. Am., Inc.*, [948 F.3d at 1354](#). Thus “processing unit,” as recited by independent claim 13 of the ’949 Patent, would also be understood as a reference to structure. See [Appx0616-0617](#) (Occhiogrosso Decl., ¶¶ 44-46).

For the aforementioned reasons, the Board’s improper construction of the “processing unit” term in independent claim 13 should be vacated.

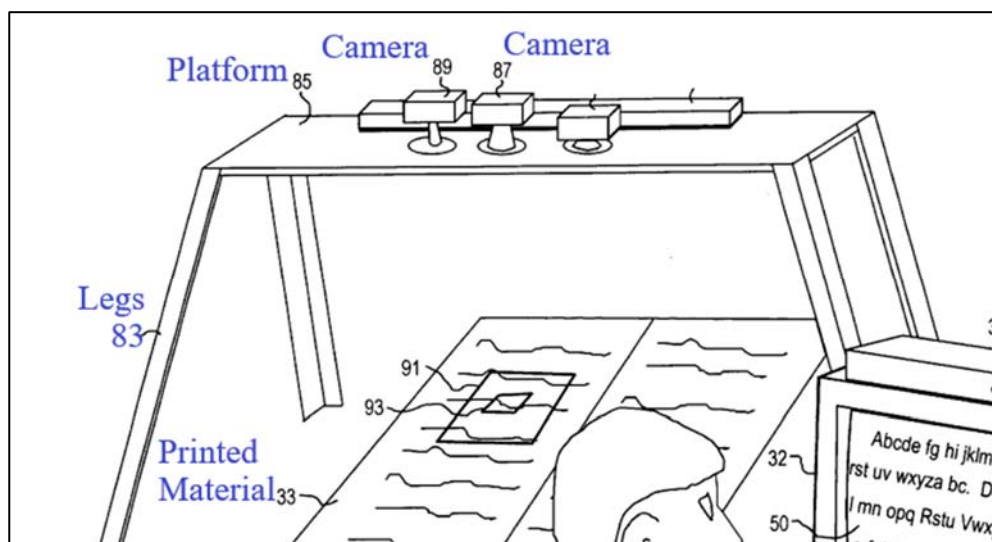
B. The Board Erred In Determining That *Sears* Renders Obvious Independent Claim 13.

1. *Sears* fails to teach or suggest claim element 13[a].

Claim element 13[a] recites, in part, “the forward facing portion [of the device housing] encompassing a digital camera . . . and encompassing a sensor.” [Appx0047](#) ('949 Patent, 16:24-29). Accordingly, claim element 13[a] requires that (a) a single portion of the “device housing” encompass both a “digital camera” and a “sensor,” and that (b) the single portion be the “forward facing portion” of the “device housing.” *See id.* The Board’s findings that *Sears* teaches or suggests those requirements of claim element 13[a] are not supported by substantial evidence.

a. *Sears* fails to teach or suggest a single portion of a “device housing” encompassing both a “sensor” and a “digital camera.”

Sears is directed towards an electronic reading system having multiple cameras mounted on a platform. *See* [Appx0405-0406](#) (*Sears*, 16:14-18:45), [Appx0394](#) (*Sears*, Fig. 3.). Figure 3 of *Sears* is reproduced below.



Appx0394 (*Sears*, Fig. 3) (excerpted and annotated). As shown, Figure 3 has “camera 87” and “camera 89” mounted on “platform 85.” *See id.* The “platform 85” is raised above the “printed material 33” by way of “legs 83.” *See id.* The electronic reading system is designed to capture images of the “printed material 33” located below “platform 85,” perform optical character recognition (OCR) on the captured images, and then read aloud the recognized text. *See Appx0405-0406* (*Sears*, 16:14-18:45).

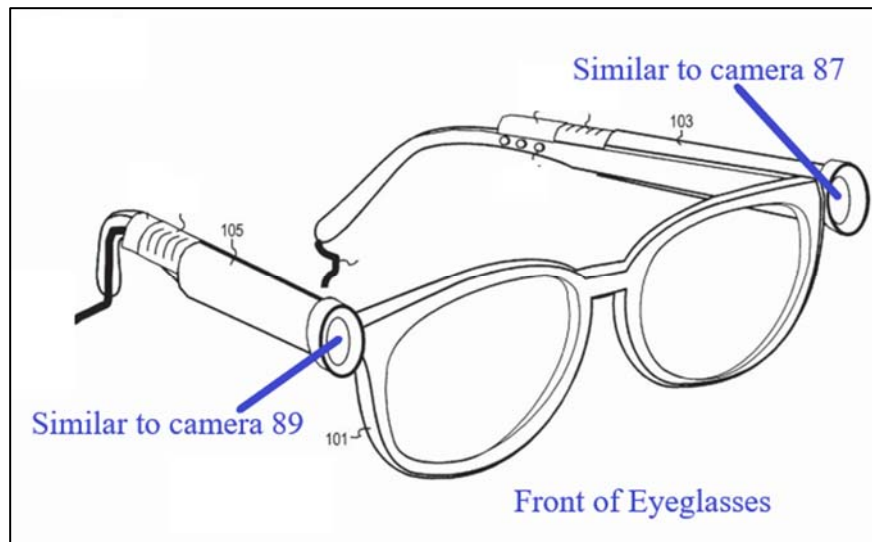
The Board/Examiner mapped *Sears*’ “camera 87” and “camera 89” to the claimed “sensor” and “digital camera,” respectively. *See Appx0644-0645* (Final OA, pp. 7-8). According to the Board/Examiner, *Sears* “discloses that the cameras may be included in a common device housing.” *Id.* (citing Appx0406 (*Sears*, 18:15-18)). But that is insufficient to meet claim element 13[a]. *Sears* is completely silent regarding the shape of the “common housing” and the positioning/location of

“camera 87” and “camera 89” within the “common housing” (Board/Examiner identified “device housing”). See [Appx0406](#) (*Sears*, 18:15-18). In fact, *Sears* provides no details at all regarding the structure or geometry of the “common housing.” *Id.* Accordingly, *Sears* does not teach or suggest that both “camera 87” and “camera 89” (the Board/Examiner-identified “sensor” and “digital camera,” respectively) are encompassed by the same single portion of the “common housing” (the Board/Examiner-identified “device housing”), as claim element 13[a] requires.

According to the Board, “Figure 3 of *Sears* discloses the location and positional relationship of the cameras . . . We determine that extension of *Sears*’ common housing to include both cameras in the same configuration as taught in *Sears*’ Figure 3 to be such ordinary creativity.” [Appx0017](#) (Decision, p. 16). But even if Figure 3 discloses the “location and positional relationship of the cameras,” whatever that may be, the Board provides no articulated reasoning as to why Figure 3 necessarily means that “camera 87” and “camera 89” (the Board/Examiner-identified “sensor” and “digital camera,” respectively) are encompassed by the same “portion” of *Sears*’ “common housing” (the Board/Examiner-identified “device housing”), which is neither shown nor described. That is improper: “Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support

the legal conclusion of obviousness.” *KSR Int’l Co. v. Teleflex Inc.*, [550 U.S. 398, 418](#) (2007) (cleaned up).

The Board/Examiner argues that “[t]he cameras will be toward the front of the [common] housing, i.e. the forward facing portion, because that is where they are taking pictures.” [Appx0716](#) (Answer, p. 7). Although not entirely clear, the Board/Examiner seems to be assuming that the “front” of *Sears*’ “common housing,” which is neither shown nor described, consists of a single portion encompassing both “camera 87” and “camera 89.” *See id.* But the Board/Examiner provides zero evidence to support that assumption. Again, the lack of evidence is unsurprising considering *Sears* provides no description or drawing of the shape of the “common housing.” The “front” of *Sears*’ “common housing” may have multiple portions, with “camera 87” and “camera 89” being encompassed by different portions, contradicting what claim 13 requires. For example, in another embodiment referenced by the Board (*see* [Appx0017](#) (Decision, p. 16)), Figure 4 shows “wide-field camera 103,” which *Sears* describes as being similar to “camera 87” (the Board/Examiner-identified “sensor”), and “narrower field camera 105,” which *Sears* describes as being similar to “camera 89” (the Board/Examiner-identified “digital camera”), located on a pair of eyeglasses. *See* [Appx0408](#) (*Sears*, 21:1-15), [Appx0395](#) (*Sears*, Fig. 4). Figure 4 of *Sears* is reproduced below:



Appx0395 (*Sears*, Fig. 4) (excerpted and annotated). Accordingly, Figure 4 is an example where the “front” of the “common housing” (i.e., pair of eyeglasses) has multiple portions, with “camera 87” and “camera 89” being encompassed on different portions. That configuration contradicts what claim 13 requires.

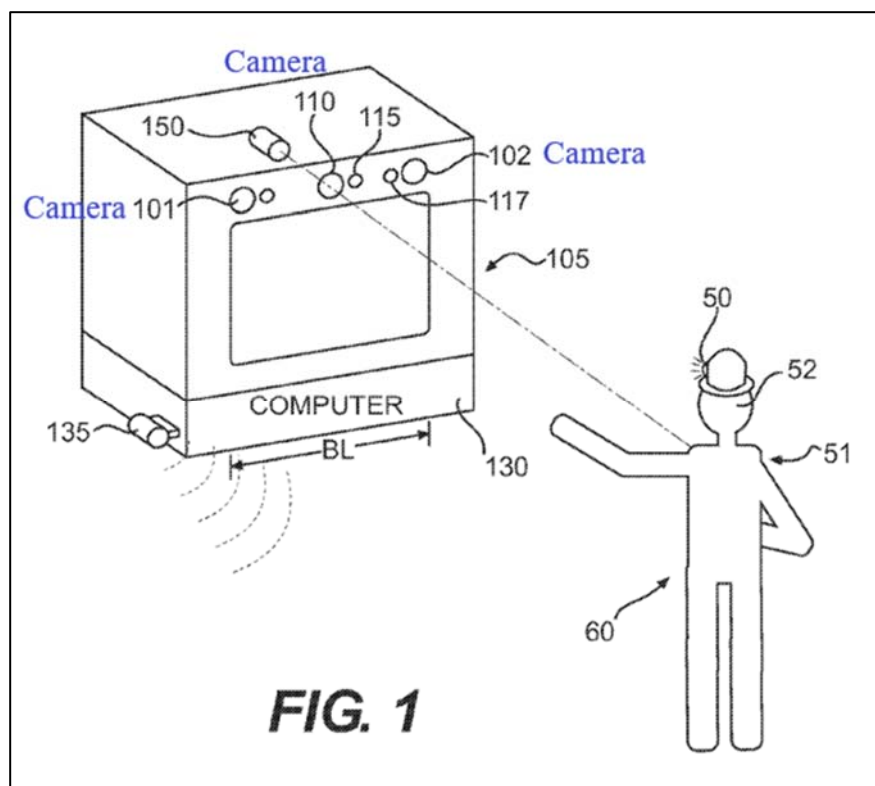
For the aforementioned reasons, the Board’s findings that *Sears* teaches or suggests claim element 13[a] are not supported by substantial evidence. Accordingly, the Board’s determination that *Sears* renders obvious independent claim 13 should be vacated or reversed.

b. *Sears* fails to teach or suggest a “forward facing portion” of the “device housing.”

Even if *Sears* teaches or suggests a single “portion” of the “device housing” encompassing both the “sensor” and the “digital camera,” *Sears* still fails to teach or suggest that the single “portion” is a “forward facing portion” of the “device housing,” as claim element 13[a] requires.

The words of a claim “are generally given their ordinary and customary meaning.” *Phillips v. AWH Corp.*, [415 F.3d 1303, 1312](#) (Fed. Cir. 2005) (en banc). The “ordinary meaning” of a claim term “is its meaning to the ordinary artisan after reading the entire patent.” *Id.* at 1321 (emphasis added).

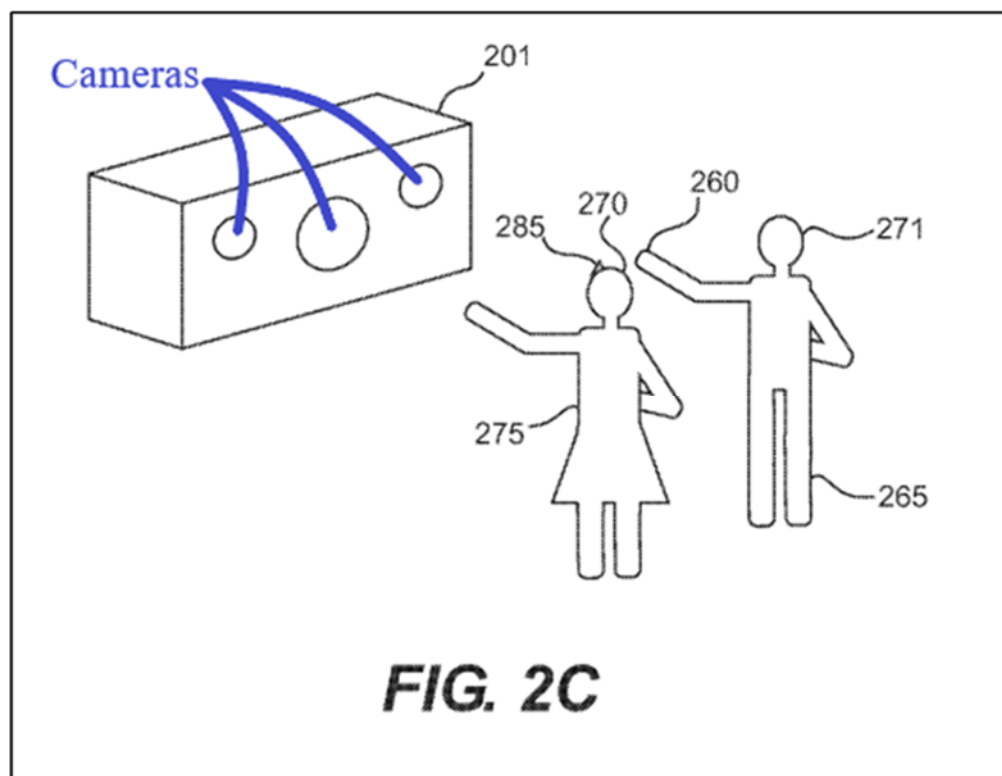
To meet the requirements of claim element 13[a], the Board/Examiner contends that the “forward facing” direction may be downwards. *See* [Appx0644](#) (Final OA, p. 7) (“The ‘forward facing’ direction may be considered down towards the printed material.”) (emphasis added). But a POSITA would not consider “forward facing” to mean downwards facing. [Appx0617-0621](#) (Occhiogrosso Decl., ¶¶ 47-52). That is because in every embodiment in the ’949 Patent, the portion of the device housing that includes a camera is not downwards facing. For example, Figure 1 of the ’949 Patent is reproduced below:



Appx0033 ('949 Patent, Fig. 1) (annotated). In Figure 1, person 51 is standing and his image is being captured by one or more of the cameras (101, 102, 110).

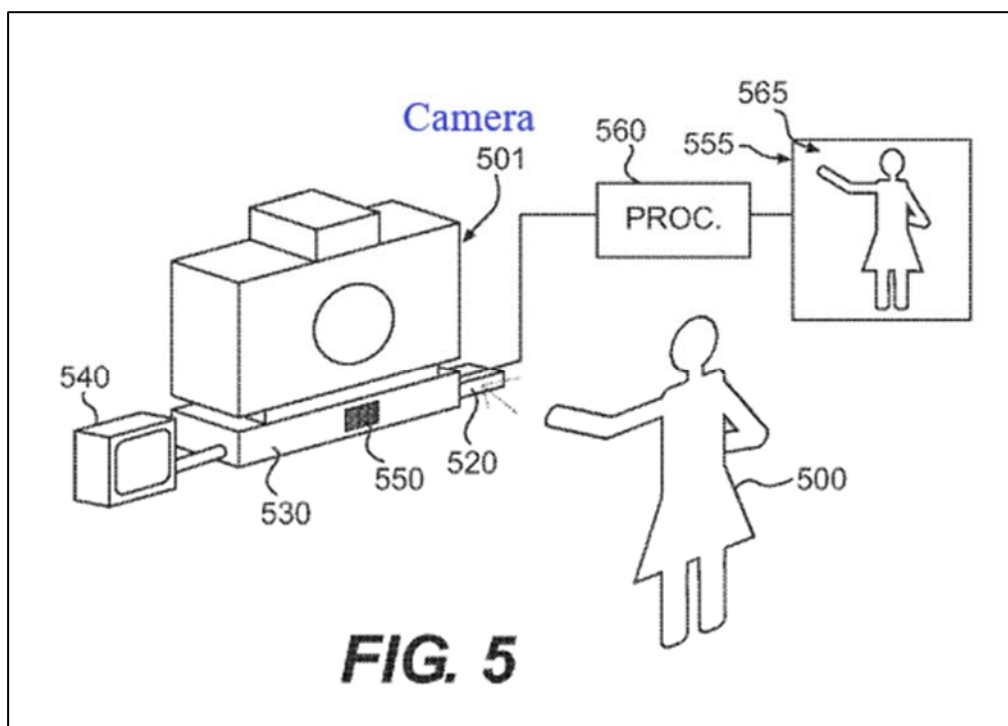
Appx0041 ('949 Patent, 3:24-36) ("The cameras [101, 102] may also be used to take pictures of an object . . . an additional camera 110 is shown in the middle of the other two . . . for picture taking."). As shown in Figure 1, the portion of the device housing that includes the cameras (101, 102, 110) is not facing downwards.

As another example, Figure 2C of the '949 Patent is reproduced below:



Appx0035 ('949 Patent, Fig. 2C) (annotated). In Figure 2C, “a point on one person, say hand 260 of man 265 having head 271, is determined, and a picture is taken by camera system 201 of the invention when this point comes within a distance . . . [from] the head 270 of woman 275.” Appx0042 ('949 Patent, 6:23-29). As shown in Figure 2C, the portion of the device housing that includes a camera is not facing downwards.

As another example, Figure 5 of the '949 Patent is reproduced below:



Appx0037 ('949 Patent, Fig. 5) (annotated). In Figure 5, “[a] girl 500 is having her picture taken by the camera of the invention 501.” Appx0044 ('949 Patent, 9:62-63). As shown in Figure 5, the portion of the device housing that includes the camera is not facing downwards.

In every embodiment in the '949 Patent, the portion of the device housing that includes a camera is not downwards facing. Thus, upon reading the entire '949 Patent, a POSITA would not consider forward facing and downwards facing to be coextensive. Appx0617-0621 (Occhiogrosso Decl., ¶¶ 47-52).

According to the Board, “[a]lthough the [Occhiogrosso] Declaration points to embodiments in the Specification as support for ‘forward facing’ excluding *downward*, we do not find the phrase ‘forward facing’ in the Specification.”

Appx0016 (Decision, p. 15). But the '949 Patent can still define “forward facing” implicitly even if “forward facing” is not expressly disclosed in the Specification: “[e]ven when guidance is not provided in explicit definitional format, the specification may define claim terms by implication such that the meaning may be found in or ascertained by a reading of the patent documents.” *Phillips*, 415 F.3d at 1321 (cleaned up). That is the case here.

In its Decision, the Board stated “[e]ven if we were to agree with Appellant that ‘forward facing’ excludes *downward*, it would have been obvious to modify Sears to this restrictive forward facing (i.e., horizontal direction) direction of reading the text because it is very well-known to read notices posted for reading in such a forward-facing direction (e.g., a sign or notice posted on a business’ door or window).” Appx0016 (Decision, p. 15) (emphasis in original). But *Sears*’ electronic reading system consists of “platform 85” raised above “printed material 33” by way of “legs 83.” See Appx0394 (*Sears*, Fig. 3). “Camera 87” and “camera 89” look down towards the “printed material 33” below “platform 85.” *Id.* The Board provides no details regarding how the proposed modification to *Sears*’ existing structure (e.g., platform, legs) would be implemented (i.e., from downward to forward facing) and no evidence that there is a reasonable likelihood of success. See Appx0016 (Decision, p. 15). That is improper: “Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some

articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (cleaned up).

For the aforementioned reasons, the Board’s findings that *Sears* teaches or suggests claim element 13[a] are not supported by substantial evidence. Accordingly, the Board’s determination that *Sears* renders obvious independent claim 13 should be vacated or reversed.

2. *Sears* fails to teach or suggest claim element 13[b].

Claim element 13[b] recites, in part, a “processing unit [] adapted to: detect a gesture . . . and subsequently capture an image using the digital camera.” Appx0047 (’949 Patent, 16:23-40). The Board/Examiner contends that “processing unit” in claim element 13[b] invokes 35 U.S.C. § 112, ¶6. *See Appx0640-0642* (Final OA, pp. 3-5). As discussed above, Appellant disagrees. But even if “processing unit” does invoke 35 U.S.C. § 112, ¶6, the Examiner fails to demonstrate that *Sears* teaches the alleged corresponding structure or an equivalent. “A challenger who seeks to demonstrate that a means-plus-function limitation was present in the prior art must prove that the corresponding structure—or an equivalent—was present in the prior art.” *Fresenius USA, Inc. v. Baxter Int’l, Inc.*, 582 F.3d 1288, 1299 (Fed. Cir. 2009).

The Board/Examiner contends that the corresponding structure for this alleged means-plus-function limitation is “computer 220, which may be a microprocessor” executing software that “will detect when a particular pose occurs” and send “a signal . . . to the camera control module 255 to hold the last frame, store it in memory, or transmit it.” [Appx0640-0642](#) (Final OA, pp. 3-5) (citing [Appx0042](#) ('949 Patent, 6:6-19)) (emphasis added). The “camera control module 255” is separate from the cameras and separate from the “computer 220.” See [Appx0035](#) ('949 Patent, Fig. 2B). The Board/Examiner mapped *Sears*’ “computer” to the claimed “processing unit.” See [Appx0644-0645](#) (Final OA, pp. 7-8). But the Board/Examiner provided no evidence that *Sears*’ “computer” is executing software that will send “a signal . . . to hold the last frame, store it in memory, or transmit it,” much less executing software that will send the signal to a “camera control module” that is separate from the cameras. To the contrary, *Sears* teaches that “when printed material 33 is placed within the field of view of the image capture 51 means, OCR 55 may begin immediately, before gestural input from the user has begun” and a “gestural command directs the system to read [(i.e., vocalize through speech synthesis)] text already interpreted.” [Appx 0406](#) (*Sears*, 18:28-34). Accordingly, the “last frame” would be the user’s hand gesture, and after the user’s hand gesture had been detected by *Sears*’ “computer,” there would be no reason for *Sears*’ “computer” to send “a signal . . . to hold the last frame, store it in memory, or transmit it.”

At bottom, *Sears* does not teach the corresponding structure (i.e., a computer executing software that will send a signal to the camera control module to hold the last frame, store it in memory, or transmit it), and the Board/Examiner did not identify or evaluate the proper test for determining equivalence under [35 U.S.C. § 112, ¶6](#).

In view of the foregoing, the Board's findings that *Sears* teaches or suggests claim element 13[b] are not supported by substantial evidence. Accordingly, the Board's determination that *Sears* renders obvious independent claim 13 should be vacated or reversed.

Further, claim element 13[b] recites, in part, “detect a gesture has been performed . . . and correlate the gesture detected by the sensor with an image capture function and subsequently capture an image.” [Appx0047](#) ('949 Patent, 16:23-40). Accordingly, the image capture function must be triggered by detection of a gesture. The Board/Examiner mapped *Sears*' image capture and interpretation via optical character recognition (OCR) to claim element 13[b]. See [Appx0644-0645](#) (Final OA, pp. 7-8) (“*Sears* discloses that if a gesture command directs the system to read text, and that text has not yet been interpreted, then image capture via OCR occurs.”) (citing [Appx0406](#) (*Sears*, 18:33-38)). The difference between image capture and OCR, which are separate processes, is important. Image capture necessarily occurs before OCR because OCR interprets an image to recognize text characters in the

image. Thus, whether a gesture triggers an image capture function is relevant to claim element 13[b], whereas whether a gesture triggers OCR is not.

Sears discloses that “when printed material 33 is placed within the field of view of the image capture 51 means, OCR 55 may begin immediately, before gestural input from the user has begun. Image capture 51, video digitizing 53 and OCR 55 may proceed opportunistically given text within the field of view, and if the gestural command directs the system to read text already interpreted, vocalization of the text through speech synthesis 63 can begin almost immediately.” [Appx0406](#) (*Sears*, 18:28-35) (emphasis added). In other words, *Sears* does not wait for a gesture to start capturing images. *Sears* begins capturing images “immediately, before [user] gestural input,” when text is within the field of view (e.g., “printed material 33” is moved such that text is within the field of view). *Id.* When a user gesture is eventually detected in *Sears*, the user gesture identifies a portion of the text within “printed material 33” to be vocalized. Because *Sears* has already captured an image with the identified portion of text, and *Sears* has already performed OCR on the image, *Sears* can begin vocalization of the identified portion of text “almost immediately” (i.e., no need to wait for image capture or OCR to be executed). *Id.* Vocalization (i.e., converting text to spoken word) is not an “image capture function” as required by the claim.

Sears also states that “[i]f the text to be read is not among that already interpreted, then image capture 51 of the indicated text using high pixel densities suitable for OCR 55 can begin.” [Appx0406](#) (*Sears*, 18:35-38). But as *Sears* indicates, image capture occurs automatically, before a gesture, when text is placed within the field of view of the image capture means. See [Appx0406](#) (*Sears*, 18:28-35). Gestures control interpretation via OCR and vocalization, not image capture.

In view of the foregoing, the Board’s findings that *Sears* teaches or suggests claim element 13[b] are not supported by substantial evidence. Accordingly, the Board’s determination that *Sears* renders obvious independent claim 13 should be vacated or reversed.

3. *Sears* is non-analogous art.

Sears is non-analogous art and thus it cannot be used in an obviousness rejection of any claim of the ’949 Patent. A reference qualifies as prior art for an obviousness determination only when it is analogous to the claimed invention. See *In re Klein*, [647 F.3d 1343, 1348](#) (Fed. Cir. 2011). Two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor’s endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved. *Donner Technology, LLC v. Pro Stage Gear, LLC*, [979 F.3d 1353, 1359](#) (Fed. Cir. 2020).

a. *Sears* fails the first test for analogous art.

In its Decision, the Board argued that Appellant has too narrowly interpreted *Sears*' field of endeavor to only electronic reading systems. [Appx0012](#) (Decision, p. 11). The Board's position is contrary to the *Sears* reference itself, which is replete with references to "electronic reading machines:" *Sears*' Title, Abstract, "Technical Field" section, "Background Art" section, "Summary of the Invention" section, and independent claims all disclose or reference electronic reading machines. *See* [Appx0391](#) (*Sears*, Title), [Appx0391](#) (*Sears*, Abstract) ("An optical-input print reading device with voice output for people with impaired or no vision") (emphasis added), [Appx0398](#) (*Sears*, 1:23-29) ("The present invention relates to an electronic reading system for converting text to synthesized speech") (emphasis added), [Appx0399](#) (*Sears*, 3:12-15) ("It was our intention to solve the problems of the prior art, both with regards to OCR-based electronic reading machines as well as electronic magnifying systems") (emphasis added), [Appx0399](#) (*Sears*, 4:12-19) ("The present invention is also directed to an electronic reading apparatus for converting text to spoken words for a user.")) (emphasis added), [Appx0411](#) (*Sears*, independent claim 1) ("A method for electronically reading text") (emphasis added), [Appx0412](#) (*Sears*, independent claim 31) ("An electronic reading apparatus for converting text to spoken words for a user") (emphasis added), and [Appx0412](#) (*Sears*, independent claim 33) ("A method for electronically reading aloud text under

interactive control by a user with a computer-based system”) (emphasis added). It was improper for the Board to disregard the substance of the *Sears* reference to maintain a baseless position. Accordingly, *Sears*’ field of endeavor is electronic reading machines. *See Airbus S.A.S. v. Firepass Corp.*, [941 F.3d 1374, 1380-81](#) (Fed. Cir. 2019) (the court finding the PTAB’s reliance on the title, specification, and claims of a prior art reference to determine the reference’s field of endeavor reasonable).

Further, the term “optical character recognition” or “OCR” appears more than 40 times in *Sears*, and the terms “text-to-speech,” “text-to-voice,” “text to spoken word,” or “speech synthesis” appear at least 10 times in *Sears*. It is well-known that electronic reading machines perform these processes (i.e., “OCR,” “text-to-speech,” etc.). *See Appx0398* (*Sears*, 1:45-51). The numerous references to “OCR,” “text-to-speech,” etc., reinforce that *Sears*’ field of endeavor is electronic reading machines.

In contrast, Appellant maintains that the field of endeavor for the ’949 Patent is a picture-taking system that performs a real-time analysis of a gesture/pose observed by a sensor, and then captures an image using a digital camera upon determining that the gesture corresponds to an image capture command. *See, e.g.*, [Appx0041-0042](#) (’949 Patent, 3:29-60, 4:66-5:49, 6:23-29), [Appx0044](#) (’949 Patent, 9:60-10:30), [Appx0047](#) (’949 Patent, 16:23-40). This picture-taking system

achieves “a method for taking pictures when certain poses of objects, sequences of poses, motions of objects, or any other states or relationships of objects are represented.” [Appx0040](#) ('949 Patent, 1:63-66). Electronic reading machines do not belong to this field of endeavor. Thus, *Sears* fails the first test for analogous art.

b. *Sears* fails the second test for analogous art.

Although the Board did “not rely on the pertinent problem test in reaching [its] decision,” the Board still indicated that *Sears* passes the second test for analogous art. [Appx0013-0014](#) (Decision, pp. 12-13). Appellant disagrees. Regarding the second test for analogous art, as explained by this Court,

the dividing line between reasonable pertinence and less-than-reasonable pertinence is context dependent, it ultimately rests on the extent to which the reference of interest and the claimed invention relate to a similar problem or purpose . . . Thus, when addressing whether a reference is analogous art with respect to a claimed invention under a reasonable-pertinence theory, the problems to which both relate must be identified and compared.

Donner Tech., LLC at 1359 (emphasis added). In other words, under the second test for analogous art, the Board/Examiner must identify the problem being solved by the '949 Patent, identify the problem being solved by *Sears*, and compare the two problems.

Sears expressly discloses:

reading machine systems, unfortunately, suffer from a variety of operational insufficiencies that limit their effectiveness. For instance, before the reading machine can begin to read a page, the user must typically wait over a minute. . .

Another insufficiency of conventional reading machines is that scanners are limited in the size of page they can process, and reading a newspaper page would require multiple passes through the scanner. Furthermore, the keypad navigation of current reading machines requires that the user move through the text in the same order in which the computer organizes the data . . .

For example, the mechanisms [in conventional magnifying systems] for tracking lines of text are often difficult to use, since they are manually-guided mechanical systems that require relatively precise and steady hand movements to guide the movement.

This requirement is difficult for certain people, especially the elderly who have fine motor problems, but also because it involves cognitive feedback control at the same time that considerable effort is being devoted to interpreting the images on the screen. Furthermore, when short columns of text are being read, the user must engage in frequent control of both vertical and horizontal mechanical guiding systems. Also, because of the small field of view of the camera and the limited movement of the mechanical system, the page must often be repositioned on the mechanical guides. Because of the small field of view of these systems, it is difficult for the user to understand the overall structure of text and graphics on a complexly formatted page. In addition, the system depends entirely on the user's vision, even though this vision may be adequate only for very slow reading . . .

It was our intention to solve the problems of the prior art, both with regards to OCR-based electronic reading machines as well as electronic magnifying systems, that gave rise to the current invention.

[Appx0398-0399](#) (*Sears*, 1:66-3:15) (emphasis added). Accordingly, *Sears* is directed towards solving the problems associated with existing electronic reading machines and magnifying systems.

According to the Board, “Appellant’s claimed invention addresses the particular problem of specifying commands using gestures.” [Appx0014](#) (Decision,

p. 13). But that is far too generic a problem statement. Appellant asserts the '949 Patent addresses the particular problem of taking pictures with a digital camera when certain gestures are recognized using a separate sensor. *See e.g.*, [Appx0041-0042](#) ('949 Patent, 3:29-60, 4:66-5:49, 6:23-29), [Appx0044](#) ('949 Patent, 9:60-10:30), [Appx0047](#) ('949 Patent, 16:23-40), [Appx0033](#) ('949 Patent, Fig. 1), [Appx0034](#) ('949 Patent, Fig. 2A), [Appx0035](#) ('949 Patent, Fig. 2C), [Appx0037](#) ('949 Patent, Fig. 5). That is not the problem to which *Sears* relates, and thus *Sears* fails the second test for analogous art.

Because *Sears* fails both tests for analogous art, it is non-analogous art and cannot be cited in any obviousness rejections. Accordingly, the Board's determination that *Sears* renders obvious independent claim 13 should be vacated or reversed.

C. The Board Erred In Determining That *Sears* Renders Obvious Dependent Claim 15.

Claim 15 depends from and adds limitations to independent claim 13. For the reasons set forth above regarding independent claim 13, the Board's determination that *Sears* renders dependent claim 15 obvious is not supported by substantial evidence and should be vacated or reversed.

Further, dependent claim 15 recites "wherein the detected gesture includes a pose," whereas dependent claim 14 recites "wherein the detected gesture includes a hand motion." [Appx0047](#) ('949 Patent, claims 14 and 15). Because the terms "pose"

and “hand motion” are different, they have different meanings. *See CAE Screenplates Inc. v. Heinrich Fiedler GmbH & Co. KG*, [224 F.3d 1308, 1317](#) (Fed. Cir. 2000) (“In the absence of any evidence to the contrary, we must presume that the use of these different terms in the claims connotes different meanings.”). The Board/Examiner “agrees that under claim differentiation principles a ‘pose’ and a ‘hand motion’ should likely not be the same exact thing.” [Appx0718](#) (Answer, p. 9). Based on the claim language alone, a “pose” is a gesture involving at least one body part other than a hand. This means that a “pose” is a gesture that may include a hand so long as the gesture also includes a body part other than the hand (e.g., lips, eyes). That interpretation is consistent with the specification of the ’949 Patent. *See, e.g., Appx0043* (’949 Patent, 7:57-59) (“one can as a photographer, choose to shoot a fashion model or other subject, and when you see a pose you like record the picture”) (emphasis added), [Appx0044](#) (’949 Patent, 10:5-9) (“The girl then poses for the camera. When the camera of the invention takes the picture according to its preprogrammed criteria (in this case, for example, defined as when her arms are over her head, and after a significant movement has occurred”) (emphasis added), [Appx0044](#) (’949 Patent, 10:24-30) (“the invention can be used to photograph all ‘smiling’ poses for example. Or poses where the smile is within certain boundaries of lip curvature even . . . [or] when the subject’s eyes are open a certain amount”) (emphasis added), [Appx0042](#) (’949 Patent, 6:50-58) (“Criteria as mentioned can

include proximity of other parts of the body . . . one could [] program the device to take the picture when on two successive frames the condition shown in FIG. 2D exists where the heads are apart in frame 1, but closer in frame 2 (probably corresponding to a movement say of the boy to kiss the girl).”) (emphasis added).

Contrary to the claim language, the Board/Examiner contends that this dependent claim is met by a hand gesture/motion:

[*Sears*] discloses that the gestural movements may be various hand motions, such as fingers moving back and forth. Col. 10 lines 39-61. There are other dedicated gestures that might be considered a pose, such as a flat hand, col. 11 line 9, or a closed fist, col. 10 lines 29-30.

Appx0646 (Final OA, p. 9) (emphasis added). It is unsurprising that the Board/Examiner failed to identify any disclosure in *Sears* that involves at least one body part other than a hand because *Sears* is silent regarding gestures other than hand/finger gestures. See Appx0408 (*Sears*, 22:5-8) (“the camera received commands, at least in part, from hand and finger gestures of the user that were captured by the camera or cameras”). The device in *Sears* cannot capture gestures involving at least one body part other than a hand because its “reading machine” is designed to read “printed material 33” placed directly below “platform 85.” Appx0394 (*Sears*, Fig. 3). There is simply no clearance for “a pose” (i.e., body parts other than or in addition to a hand) between “platform 85” and the “printed material 33.” *Id.*

According to the Board, “we do not find where the Specification defines a ‘pose’ is required to be a gesture involving at least one body part other than a hand.” [Appx0022](#) (Decision, p. 21). But the specification need not define a “pose” given the clear plain meaning of the claims. Moreover, the ’949 Patent can still implicitly define “pose” even if “pose” is not expressly defined in the Specification: “[e]ven when guidance is not provided in explicit definitional format, the specification may define claim terms by implication such that the meaning may be found in or ascertained by a reading of the patent documents.” *Phillips*, [415 F.3d at 1321](#) (cleaned up). That is the case here.

Although not entirely clear, the Board appears to argue that a “pose” may involve only the hand because “the Specification [[Appx0042](#) (’949 Patent, 5:36)] states that a gesture is an example of a pose (‘poses (e.g., gestures)’)” and that a gesture may involve only a hand. See [Appx0021-0022](#) (Decision, pp. 20-21) (quoting [Appx0045](#) (’949 Patent, 11:16-20)). But original claim 11 discloses an alternative embodiment where a pose is a non-limiting example of a gesture. See [Appx0159](#) (original claim 11) (“wherein the determined gesture includes a pose”). The “original claims are part of the original specification.” *Ariad Pharms., Inc. v. Eli Lilly & Co.*, [598 F.3d 1336, 1349](#) (Fed. Cir. 2010). Accordingly, with claim 15, patentee chose to only capture that alternative embodiment (i.e., a pose is a non-

limiting example of a gesture). So even if a gesture may involve only a hand, that does not mean the same is true for the claimed “pose.”

Further, the Board’s Decision relied on extrinsic evidence in the form of a non-contemporaneous, generic online dictionary for evidence that the definition of “pose” does not mean a gesture involving at least one body part other than a hand. *See Appx0022* (Decision, p. 21). But this Court has explained that the Board may not rely on a dictionary or treatise to “contradict any definition found in or ascertained by a reading of the patent documents.” *Phillips* at 1322-23 (cleaned up) (emphasis added). Yet that is exactly what the Board did.

For the aforementioned reasons, the Board’s determination that *Sears* renders obvious dependent claim 15 should be vacated or reversed.

D. The Board Erred In Determining That *Sears* Renders Obvious Dependent Claim 18.

Claim 18 depends from and adds limitations to independent claim 13. For the reasons set forth above regarding independent claim 13, the Board’s determination that *Sears* renders dependent claim 18 obvious is not supported by substantial evidence and should be vacated or reversed.

Further, dependent claim 18 recites “[t]he image capture device of claim 13 wherein the sensor is fixed in relation to the digital camera.” *Appx0047* (’949 Patent, claim 18). By virtue of depending from claim 13, claim 18 includes all of the requirements of claim 13. *See 35 U.S.C. § 112, ¶ 4* (“A claim in dependent form

shall be construed to incorporate by reference all the limitations of the claim to which it refers.”) (emphasis added). Accordingly, dependent claim 18 also includes the requirement of “a device housing including a . . . forward facing portion encompassing a digital camera . . . and encompassing a sensor.” [Appx0047](#) (’949 Patent, claim 13).

As discussed above, to meet the requirements common to claims 13 and 18 (e.g., “a device housing including a . . . forward facing portion encompassing a digital camera . . . and encompassing a sensor”), the Board cited to the embodiment in Figure 3 of *Sears* including “camera 87” (the Board-identified “sensor”) and “camera 89” (the Board-identified “digital camera”) mounted on “platform 85.” See [Appx0642-0645](#) (Final OA, pp. 5-8). That embodiment has two mutually exclusive sub-embodiments: sub-embodiment (1) and sub-embodiment (2). In sub-embodiment (1), “camera 89” moves along at least two axes, while “camera 87” is fixed. See [Appx0405](#) (*Sears*, 16:19-22), [Appx0406](#) (*Sears*, 17:29-39). In sub-embodiment (2), instead of moving “camera 89,” one or more mirrors are rotated while camera “89” remains fixed in location. See [Appx0406](#) (*Sears*, 17:40-43).

But to meet the requirements specific to dependent claim 18 (i.e., “wherein the sensor is fixed in relation to the digital camera”), the Board references a different embodiment in Figure 4 of *Sears*. See [Appx0024-0025](#) (Decision, pp. 23-24) (“we conclude that cameras ‘mounted on the user's head’ [] as shown in Sears at Figure 4

is sufficient to show the obviousness of claim 18”) (emphasis added). In the embodiment of Figure 4, two cameras are located on a pair of eyeglasses. *See Appx0408* (*Sears*, 21:8-15), *Appx0395* (*Sears*, Fig. 4). The Board provides no articulated reasoning as to why it would be obvious to combine the embodiments of Figures 3 and 4 in *Sears*, which includes replacing the camera configuration of sub-embodiment (1) or sub-embodiment (2) with the camera configuration of Figure 4. *See Appx0024-0025* (Decision, pp. 23-24). That is improper: “Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (cleaned up). *See also In re Stepan Co.*, 868 F.3d 1342, 1346 n.1 (Fed. Cir. 2017) (“Whether a rejection is based on combining disclosures from multiple references [or] combining multiple embodiments from a single reference . . . there must be a motivation to make the combination and a reasonable expectation that such a combination would be successful, otherwise a skilled artisan would not arrive at the claimed combination.”).

For the aforementioned reasons, the Board’s determination that *Sears* renders obvious dependent claim 18 should be vacated or reversed.

E. The Board Erred In Determining That *Sears* Renders Obvious Dependent Claims 14, 16, and 17.

Claims 14, 16, and 17 depend from and add limitations to independent claim 13. For the reasons set forth above regarding independent claim 13, the Board's determination that *Sears* renders dependent claims 14, 16, and 17 obvious is not supported by substantial evidence and should be vacated.

F. The Board Erred In Determining That *Sears* Renders Obvious Independent Claim 8.

Independent claim 8 is similar to independent claim 13. According to the Board, "this rejection of claim 8 turns on our decision as to the rejection of claim 13." [Appx0004-0005](#) (Decision, pp. 3-4). Thus, for the reasons set forth above regarding independent claim 13, the Board's determination that *Sears* renders independent claim 8 obvious is not supported by substantial evidence and should be vacated.

G. The Board Erred In Determining That *Sears* Renders Obvious Dependent Claim 10.

Claim 10 depends from and add limitations to independent claim 8. For the reasons set forth above regarding independent claim 8, the Board's determination that *Sears* renders dependent claim 10 obvious is not supported by substantial evidence and should be vacated.

Further, claim 10 is similar to claim 15. According to the Board, "this rejection of claim 10 turns on our decision as to the rejection of claims 8 and 15."

Appx0005 (Decision, p. 4). Thus, for the reasons set forth above regarding claim 15, the Board's determination that *Sears* renders dependent claim 10 obvious is not supported by substantial evidence and should be vacated.

H. The Board Erred In Determining That *Sears* Renders Obvious Dependent Claim 11.

Claim 11 depends from and add limitations to independent claim 8. For the reasons set forth above regarding independent claim 8, the Board's determination that *Sears* renders dependent claim 11 obvious is not supported by substantial evidence and should be vacated.

Further, claim 11 is similar to claim 18. According to the Board, "this rejection of claim 11 turns on our decision as to the rejection of claims 8 and 18." Appx0005 (Decision, p. 4). Thus, for the reasons set forth above regarding claim 18, the Board's determination that *Sears* renders dependent claim 11 obvious is not supported by substantial evidence and should be vacated.

I. The Board Erred In Determining That *Sears* Renders Obvious Dependent Claims 9 and 12.

Claims 9 and 12 depend from and add limitations to independent claim 8. For the reasons set forth above regarding independent claim 8, the Board's determination that *Sears* renders dependent claims 9 and 12 obvious is not supported by substantial evidence and should be vacated.

J. The Board Erred By Not Vacating The Reexam Order Because No Substantial New Question (SNQ) Of Patentability Exists

Section 303 of Title 35 “requires the examiner to determine whether a ‘substantial new question of patentability’ is raised by the reexamination request. Only if a new question of patentability is raised, can the patent be reexamined.” *In re Recreative Techs. Corp.*, [83 F.3d 1394, 1396](#) (Fed. Cir. 1996). The USPTO “considers the standard for reexamination met when there is a substantial likelihood that a reasonable examiner would consider the prior art patent or printed publication important in deciding whether or not the claim is patentable.” *P&G v. Kraft Foods Global, Inc.*, [549 F.3d 842, 848](#) (Fed. Cir. 2008) (cleaned up).

As explained in the Appeal Brief, “[d]uring prosecution of the ’949 Patent, Applicant amended the independent claims to clarify that the forward facing portion of the device housing encompasses a sensor and a digital camera . . . This is one of several technical teachings that were missing from the art during the original prosecution of the ’949 Patent.” [Appx0703](#) (Appeal Br., p. 35) (citing [Appx0270-0278](#), [Appx0316-0324](#)). In the Reexam Order granting the request for *ex parte* reexamination of the ’949 Patent, the Office asserted that *Sears* alone raised a SNQ of patentability because *Sears* alone appears to provide the technical teachings that were missing from the cited prior art during prosecution. See [Appx0597-0598](#) (Reexam Order, pp. 4-5). Appellant disagrees.

As discussed above in reference to claim element 13[a], *Sears* does not teach or suggest a forward facing portion of the device housing encompassing a sensor and a digital camera. In other words, *Sears* alone does not provide the technical teachings that were missing from the art during the original prosecution of the '949 Patent. Thus, a reasonable examiner would not consider *Sears* alone to be important in deciding whether one or more claims of the '949 Patent are patentable, and *Sears* alone does not raise a SNQ of patentability. Accordingly, the order for *ex parte* reexamination of the '949 Patent should be vacated.

K. The USPTO Does Not Have Jurisdiction Over the Expired '949 Patent.

In *Oil States*, the Supreme Court explained that the “decision to grant a patent is a matter involving public rights—specifically, the grant of a public franchise.” *Oil States Energy Servs., LLC v. Greene’s Energy Grp., LLC*, [138 S. Ct. 1365, 1373](#) (2018) (emphasis in original). “Specifically, patents are public franchises that the Government grants to the inventors of new and useful improvements.” *Id.* (internal quotation marks omitted). The Court explained that “Congress [has] significant latitude to assign [the] adjudication of public rights to entities other than Article III courts.” *Id.* at 1368. In exercising its “significant latitude,” Congress grants public franchises “subject to the qualification that the PTO has the authority to reexamine—and perhaps cancel—a patent claim in an inter partes review.” *Id.* at 1368, 1374 (internal quotation marks omitted). Accordingly, so long as the public franchise

exists, the Patent Office may have jurisdiction to amend and cancel the claims of the patent (e.g., via *ex parte* reexamination).

When a patent expires, however, the public franchise ceases to exist and the franchisee (e.g., the patent owner) no longer has the right to exclude others. At most, the franchisee may be entitled to collect damages arising from the public franchise that formerly existed through an infringement action in district court. But because the public franchise no longer exists after the patent expires, the Patent Office has nothing in its authority to cancel or amend. Expiration thus removes the patent from the Patent Office's jurisdiction and returns it to the sole jurisdiction of the Article III courts, which have exclusive authority to govern claims for damages. If this were not so, the Patent Office would purport to have authority to retroactively modify a public franchise that no longer exists, in a setting where the expired public franchise does not enjoy any presumption of validity and in which amendment of claims is no longer permitted.

The '949 Patent issued in November 2014 and expired in May 2020, long before the *ex parte* reexamination request was filed in November 2021. *See* [Appx0031](#), [Appx0105](#). With the expiration of the '949 Patent in May 2020, the USPTO ceased to have jurisdiction over the '949 Patent, and the order granting reexamination should be vacated as a result.

In rejecting Patent Owner’s argument, the Board argued “we disagree that Appellant has no rights under the expired patent.” [Appx0026](#) (Decision, p. 25). Appellant never argued that it had no rights under the expired patent. Appellant argued that the USPTO loses its jurisdiction to cancel or amend the patent when the patent expires. *See* [Appx0701-0702](#) (Appeal Br., pp. 33-34).

Further, in rejecting Patent Owner’s argument, the Board relied on Title 35 of the United States Code and identified several cases where this Court reviewed the Board’s decision even though the patent under reexamination expired prior to the Board issuing its decision. *See* [Appx0026-0027](#) (Decision, pp. 25-26). But the Board failed to address the fundamental issue of whether the Patent Office has jurisdiction over expired patents in view of the *Oil States* decision. *See id.* It does not, for the foregoing reasons.

VIII. CONCLUSION AND RELIEF SOUGHT

For the foregoing reasons, Appellant respectfully requests that the Court (1) vacate or reverse the Board’s determinations that claims 8-18 are rendered obvious by the cited art, (2) vacate the order granting *ex parte* reexamination of the ’949 Patent, and (3) vacate the Board’s Decision because the USPTO does not have jurisdiction over expired patents.

CERTIFICATE OF SERVICE

I hereby certify that I electronically filed the foregoing with the Clerk of the Court of the United States Court of Appeals for the Federal Circuit by using the appellate CM/ECF system on March 21, 2024.

I certify that all participants in the case are registered CM/ECF users and that service will be accomplished by the appellate CM/ECF system.

Dated: March 21, 2024

/s/ Fred I. Williams
Fred I. Williams

FORM 19. Certificate of Compliance with Type-Volume Limitations

Form 19
July 2020

**UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT**

CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITATIONS

Case Number: 2024-1038

Short Case Caption: In re: Gesture Technology Partners, LLC

Instructions: When computing a word, line, or page count, you may exclude any items listed as exempted under Fed. R. App. P. 5(c), Fed. R. App. P. 21(d), Fed. R. App. P. 27(d)(2), Fed. R. App. P. 32(f), or Fed. Cir. R. 32(b)(2).

The foregoing filing complies with the relevant type-volume limitation of the Federal Rules of Appellate Procedure and Federal Circuit Rules because it meets one of the following:

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Date: 03/21/2024

Signature: /s/ Fred I. Williams

Name: Fred I. Williams

ADDENDUM



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EXAMINER

MENEFEY, JAMES A

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte GESTURE TECHNOLOGY PARTNERS, LLC
Patent Owner and Appellant

Appeal 2023-001857
Reexamination Control 90/014,903
Patent 8,878,949 B2
Technology Center 3900

Before ALLEN R. MacDONALD, MICHAEL J. ENGLE, and
BRENT M. DOUGAL, *Administrative Patent Judges*.

MacDONALD, *Administrative Patent Judge*.

DECISION ON APPEAL
STATEMENT OF THE CASE

Pursuant to [35 U.S.C. § 134\(b\)](#) and [306](#), Gesture Technology Partners, LLC (Appellant)¹ appeals from the final rejection of claims 8–18. Appeal Br. 8. Patent claims 1–7 have been confirmed by the Examiner, and thus are not at issue. Final Act. 21. We have jurisdiction under [35 U.S.C. § 6\(b\)](#).

We affirm.

¹ Appellant identifies the real party in interest as Gesture Technology Partners, LLC. Appeal Br. 1.

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CLAIMED SUBJECT MATTER

Claims 13, 15, and 18, are illustrative of the claimed subject matter (emphasis, formatting, and bracketed material added):

13. An image capture device comprising:

[13.A.] a device housing including a *forward facing* portion, the forwarding facing portion encompassing a digital camera adapted to capture an image and having a field of view and encompassing a sensor adapted to detect a gesture in the digital camera field of view; and

[13.B.] a processing unit operatively coupled to the sensor and to the digital camera, wherein the processing unit is adapted to:

[13.B.i.] *detect a gesture* has been performed in the electro-optical sensor field of view based on an output of the electro-optical sensor, and

[13.B.ii.] *correlate the gesture* detected by the sensor *with* an image capture *function* and subsequently capture an image using the digital camera, wherein the detected gesture is identified by the processing unit apart from a plurality of gestures.

15. The image capture device of claim 13 wherein the detected *gesture includes a pose*.

18. The image capture device of claim 13 wherein the sensor is *fixed in relation* to the digital camera.

Appeal Br. 39, 40 (Claims App.).

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REFERENCE²

The Examiner relies on the following reference:

Name	Reference	Date
Sears	US 6,115,482	Sept. 5, 2000

REJECTION³

The Examiner rejects claims 8–18 under 35 U.S.C. § 103 as being unpatentable over Sears. Final Act. 5–11.

Appellant presents separate arguments for claims 13, 15, and 18. Appeal Br. 20–28. Appeal Br. 10–27.

To the extent that Appellant discusses this rejection of claims 14, 16, and 17, Appellant merely references (or repeats) the argument directed to claim 13. Appeal Br. 27. Such a referenced (or repeated) argument is not an argument for “separate patentability.” Thus, Appellant does not present separate arguments for this rejection of claims 14, 16, and 17. Therefore, this rejection of claims 14, 16, and 17 turns on our decision as to the rejection of claim 13. Except for our ultimate decision, we do not address the merits of this § 103 rejection of claims 14, 16, and 17 further herein.

To the extent that Appellant discusses this rejection of claim 8, Appellant merely repeats (or references) the arguments directed to claim 13. Appeal Br. 27–31. Such a repeated (or referenced) argument is not an argument for “separate patentability.” Thus, Appellant does not present a separate argument for this rejection of claim 8. Therefore, this rejection of

² Citations herein is by the first named inventor.

³ For simplicity herein, we refer to the Examiner’s rejection under § 103(a) as a rejection under § 103.

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claim 8 turns on our decision as to the rejection of claim 13. Except for our ultimate decision, we do not address the merits of this § 103 rejection of claim 8 further herein.

To the extent that Appellant discusses this rejection of claim 10, Appellant merely references (or repeats) the arguments directed to claims 8 and 15. Appeal Br. 31. Such a referenced (or repeated) argument is not an argument for “separate patentability.” Thus, Appellant does not present separate arguments for this rejection of claim 10. Therefore, this rejection of claim 10 turns on our decision as to the rejection of claims 8 and 15. Except for our ultimate decision, we do not address the merits of this § 103 rejection of claim 10 further herein.

To the extent that Appellant discusses this rejection of claim 11, Appellant merely references (or repeats) the arguments directed to claims 8 and 18. Appeal Br. 31–32. Such a referenced (or repeated) argument is not an argument for “separate patentability.” Thus, Appellant does not present separate arguments for this rejection of claim 11. Therefore, this rejection of claim 11 turns on our decision as to the rejection of claims 8 and 18. Except for our ultimate decision, we do not address the merits of this § 103 rejection of claim 11 further herein.

To the extent that Appellant discusses this rejection of claims 9 and 12, Appellant merely references (or repeats) the argument directed to claim 8. Appeal Br. 32. Such a referenced (or repeated) argument is not an argument for “separate patentability.” Thus, Appellant does not present separate arguments for this rejection of claims 9 and 12. Therefore, this rejection of claims 9 and 12 turns on our decision as to the rejection of

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claim 8. Except for our ultimate decision, we do not address the merits of this § 103 rejection of claims 9 and 12 further herein.

PRINCIPLES OF LAW – CLAIM CONSTRUCTION

A.⁴

During examination of a patent application, a claim normally is given its broadest reasonable construction consistent with the specification. *In re Prater*, [415 F.2d 1393, 1404–1405](#) (CCPA 1969). However, “[w]hen a patent expires during a reexamination proceeding, the PTO should thereafter apply the *Phillips* [*v. AWH Corp.*, [415 F.3d 1303](#) (Fed. Cir. 2005) (en banc)] standard for claim construction.” *In re CSB-Sys. Int’l, Inc.*, [832 F.3d 1335, 1341](#) (Fed. Cir. 2016).

“[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Phillips*, [415 F.3d at 1313](#).

B.

“Claims must be read in view of the specification, of which they are a part.” *Markman v. Westview Instruments, Inc.*, [52 F.3d 967, 979](#) (Fed. Cir. 1995) (en banc). However, “limitations are not to be read into the claims from the specification.” *In re Van Geuns*, [988 F.2d 1181, 1184](#) (Fed. Cir. 1993) (citing *In re Zletz*, [893 F.2d 319, 321](#) (Fed. Cir. 1989)).

⁴ The subject patent of this appeal expired in May 2020 before the filing of the November 11, 2021 Request for Reexamination. *See* Appeal Br. 34. The Examiner acknowledges the ’949 Patent has expired. *See* Final Act. 2; Ans. 12.

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OPINION

We have reviewed the Examiner’s rejections in light of Appellant’s arguments (Appeal Brief) that the Examiner has erred.⁵ We disagree with Appellant’s conclusions. Except as noted below, we adopt as our own (1) the findings and reasons set forth by the Examiner in the action from which this appeal is taken and (2) the reasons set forth by the Examiner in the Examiner’s Answer in response to Appellant’s Appeal Brief.

A. Analogous Art

Appellant raises the following arguments in contending that the Examiner erred in citing Sears because Sears is non-analogous art. Appeal Br. 8–9. Appellant correctly states:

A reference qualifies as prior art for an obviousness determination ***only when it is analogous to the claimed invention***. See *In re Klein*, [647 F.3d 1343, 1348](#) (Fed. Cir. 2011). Two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor’s endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved. *Donner Technology, LLC v. Pro Stage Gear, LLC*, [979 F.3d 1353, 1359](#) (Fed. Cir. 2020).

Appeal Br. 8 (emphasis added).

⁵ Although Appellant also argues (Appeal Br. 5–7) ““processing unit” does not invoke [35 U.S.C. § 112, ¶6](#)” (Appeal Br. 7), we do not find where Appellant explains how this assertion results in an error in the rejection.

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A.1. Analogous Art – First Test

Appellant argues:

Regarding the first test for analogous art, *Sears* describes itself as relating to

an electronic reading system for converting text to synthesized speech that may be used by low-vision and blind people . . . and more particularly relat[ing] to an electronic reading system that includes improved functionality for allowing the user to navigate within the text.

Sears, 1:23–29. In contrast, the '949 Patent is directed to a picture-taking system that performs a real-time analysis of a gesture (e.g., pose) observed by a sensor, and then captures an image using a digital camera upon determining that the gesture corresponds to an image capture command. *See, e.g.*, '949 Patent, 3:29–60, 4:66–5:3, 5:24–49, 6:23–29, 9:60–10:30. This picture-taking system achieves

a method for taking pictures when certain poses of objects, sequences of poses, motions of objects, or any other states or relationships of objects are represented.

'949 Patent, 1:63–66. Accordingly, *Sears* and the '949 Patent are not from the same field of endeavor, and *Sears* fails the first test for analogous art.

Appeal Br. 8–9 (emphasis and formatting added).

The Examiner's position is flawed because the Examiner arbitrarily excludes "electronic reading machines" from the Examiner-identified field of endeavor for *Sears*. The Examiner's position is clearly contrary to the *Sears* reference, which is replete with references to "electronic reading machines." *Sears*' Title, Abstract, "Technical Field" section, "Background Art" section, "Summary of the Invention" section, and independent claims all disclose or reference electronic reading machines.

Reply Br. 4.

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We are not persuaded by Appellant’s argument. Firstly, Appellant starts from the wrong perspective—the field of endeavor of Sears—and then looking to see if the ’949 Patent is in that field. As Appellant notes in its citation of the law, the focus of the first test is whether Sears is “within the field of the inventor’s endeavor,” not the other way around. Appeal Br. 8; *see also In re Klein*, [647 F.3d at 1348](#) (citing *In re Bigio*, [381 F.3d 1320, 1325](#) (Fed.Cir.2004); *In re Clay*, [966 F.2d 656, 658](#) (Fed.Cir.1992)). Thus, even if Sears is focused on a subset of the field of endeavor of the ’949 Patent, it can still be within the same field of the ’949 Patent.

The Federal Circuit has further explained that “[t]he field of endeavor of a patent is not limited to the specific point of novelty, the narrowest possible conception of the field, or the particular focus within a given field.” *Unwired Planet, LLC v. Google Inc.*, [841 F.3d 995, 1001](#) (Fed. Cir. 2016).

Here, the Examiner correctly starts by analyzing the field of the ’949 Patent, and then determining whether Sears is in that field. Final Act. 15; *see also* Ans. 4–5. The Examiner determines:

The ‘949 patent first states that “stereo photogrammetry is combined with digital image acquisition to acquire or store scenes and poses of interest, and/or to interact with the subject in order to provide data to or from a computer.” Col. 1 lines 6-10 (emphasis added). Sears likewise uses photogrammetry and digital image acquisition to interact with a subject and provide data to or from a computer. Both references are drawn to cameras that take actions based on detected gestures. This is the same general field.

Final Act. 15; *see also* Ans. 4–5. The record confirms the Examiner’s findings and ultimate conclusion.

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The Examiner cites to the opening paragraph of the '949 Patent which provides a number of general statements concerning the disclosed invention. Final Act. 15 (citing '949 Patent, 1:6–10). The Examiner's focus on cameras that take actions based on detected gestures is further supported by the title of the '949 Patent, "*Camera Based Interaction and Instruction*." '949 Patent, [54] (emphasis added, capitalization omitted). Similarly, the "Background" and "Summary of the Invention" sections support the Examiner's findings concerning the field. *See, e.g.*, '949 Patent, 1:24–30 ("there are few cases known to the inventor where the camera taking the picture actually determines some variable in the picture and uses it for the process of obtaining the picture"); 1:30–35; 1:44–46 ("There is no known picture taking reference based on object position and orientation with respect to the camera, or other objects that I am aware of."); 1:63–2:8 (discussing taking pictures as a result of certain poses in the image).

The rest of the '949 Patent also confirms the Examiner's findings concerning the field of endeavor. For example, in the '949 Patent, "[t]he sequence of frames of this activity (a 'gesture' of sorts by both parties) is recorded, and the speed of approach, the head positions and any other pertinent data determined." '949 Patent, 6:66–7:2. Such gesture data is treated as a command. "When a subject undertakes a particular signal comprising a position or gesture-i.e. a silent command to take the picture (this could be programmed, for example, to correspond to raising one's right hand)." '949 Patent, 5:46–49.

Similarly, Appellant interprets the '949 Patent's field of endeavor as "a picture-taking system that performs a real-time analysis of a gesture (e.g.,

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pose) observed by a sensor, and then captures an image using a digital camera upon determining that the gesture corresponds to an image capture command.” Appeal Br. 8–9. Though Appellant attempts to improperly narrow the ’949 Patent’s field of endeavor by including excessive detail, Appellant’s argument further supports the Examiner’s findings concerning the ’949 Patent’s field of endeavor.

Thus, the above shows that the ’949 Patent encompasses the broader field of specifying commands using gestures captured by a camera.

The Examiner also correctly determines that Sears is within the field of endeavor of the ’949 Patent. Final Act. 15; *see also* Ans. 4–5. This is supported by the disclosure of Sears. Sears is titled “Voice-Output Reading System *with Gesture-Based Navigation*.” Sears, [54] (emphasis added, capitalization omitted).

Like the ’949 Patent, Sears points out that “[i]t is an object of the invention . . . ***to specify control system parameters through manual gestures.***” Sears 3:19–21 (emphasis added). Further, the Abstract of Sears states:

An optical-input print reading device with voice output for people with impaired or no vision in which the user provides input to the system from hand gestures. Images of the text to be read, on which the user performs finger- and hand-based gestural commands, are input to a computer, which decodes the text images into their symbolic meanings through optical character recognition, and further tracks the location and movement of the hand and fingers in order to interpret the gestural movements into their command meaning.

Sears, Abstr. Furthermore, Sears at column 4, lines 3–7, states, “[t]he method includes . . . determining a command signal from a sequence of

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user-generated spatial configurations of at least one pointer[.]” Also further, Sears claims:

capturing a temporal sequence of digital images of user-generated spatial configurations of at least one pointer;
determining a command signal from the temporal sequence of digital images;

Sears, claim 1, 28:39–42.

All of the above supports the Examiner’s position concerning Sears.

Appellant states that Sears is directed to “an electronic reading system for converting text to synthesized speech that may be used by low-vision and blind people . . . and more particularly relat[ing] to an electronic reading system that includes improved functionality for allowing the user to navigate within the text.” Appeal Br. 8 (quoting Sears, 1:23–29). Appellant does not go into further detail in the Appeal Brief, but later argues that it is improper for the Examiner to “exclude[] ‘electronic reading machines’ from the Examiner-identified field of endeavor for *Sears*.” Reply Br. 4; *see also id.* at 4–6 (discussing the many references to electronic reading machines and optical character recognition in Sears).

We agree that Sears appears to be directed to a narrower field of endeavor than the ’949 Patent. However, that does not mean that it is not within the field of endeavor of the ’949 Patent. As recognized by Appellant, Sears is also directed to navigation of the document (Appeal Br. 8), which as shown above, is done through specifying commands using gestures captured by a camera. Thus, we reject Appellant’s attempt to narrowly interpret Sears’ field of endeavor to only “an electronic reading system.” Reply Br. 4–6; Appeal Br. 8.

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We conclude that *Sears* is within the field of endeavor of the claimed invention and thus analogous art.

A.2. Analogous Art – Second Test

Appellant also argues:

When addressing whether a reference is analogous art with respect to a claimed invention under a reasonable-pertinence theory (i.e., the second test for analogous art), the ***problems*** to which both relate must be identified and compared. *Donner*, 979 F.3d at 1359. According to the Examiner, the problem being solved by the '949 Patent is the lack of automatic “picture taking [] based on object position and orientation with respect to the camera.” Action, p. 15 (citing '949 Patent, 1:44–46). In contrast, *Sears* discloses that it is solving “the problems of the prior art, both with regards to OCR-based electronic reading machines as well as electronic magnifying system.” *Sears*, 3:12–15. These are not the problems to which the '949 Patent relates, and thus *Sears* fails the second test for analogous art.

Appeal Br. 9 (emphasis added).

Both Patent Owner and the Examiner now agree that *Sears* fails the second test for analogous art. See Answer, p. 5 (“Upon further consideration, *Sears* does not pass the second test”) (emphasis added).

Reply Br. 4.

We do not rely on the pertinent problem test in reaching our decision. However, we are compelled to state that we disagree with the Examiner’s determination that *Sears* fails the second test for analogous art.

In *Donner*, the Federal Circuit held that the Board defined the pertinent problem too “narrowly.” *Donner*, 979 F.3d at 1360. The analysis of “[t]he problems to which the claimed invention and reference at issue relate” “must be carried out from the vantage point of a PHOSITA who is considering turning to the teachings of references outside her field of

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endeavor” and therefore must not “rule out all such art” that is “outside her field of endeavor.” *Id.* The Federal Circuit held that “if the two references have ‘pertinent similarities’ such that [the prior art reference] is reasonably pertinent to one or more of the problems to which the [patent-in-suit] pertains, then [the prior art reference] is analogous art.” *Id.* at 1361. Such is the case here with *Sears*. Thus, the Examiner’s conclusion that the test only looks at the narrow general purpose of a reference is misguided. We note that for the reasons discussed above, Appellant’s claimed invention addresses the particular problem of specifying commands using gestures and *Sears* is directed to gesture-based navigation.

B. Claim 13

Appellant raises the following arguments in contending that the Examiner erred in rejecting claim 13 under 35 U.S.C. § 103 as being unpatentable over *Sears*. *See* Appeal Br. 10–21.

B.1. Claim 13, element [a]

B.1.a. Claim 13, element [a] – Appellant’s Contentions

Appellant argues:

[B]ecause the Examiner uses the embodiment from *Sears* that only has cameras and sensors that face downwards, the Examiner is forced to improperly recast the downward direction as being “forward facing.” Action, p. 7 (“The ‘forward facing’ direction may be considered down towards the printed material.”) (emphasis added). But one of skill in the art would not consider forward facing to mean downwards facing. [Occhiogrosso] ExpertDec, ¶¶ 47–54.

Appeal Br. 10–11. According to Appellant:

The Examiner contends that[:]

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it is apparent that “forward facing” would be understood by a [POSITA] in the context of which direction the device itself is facing. For a camera, this would be the direction in which the camera is pointing, where it is going to take a picture. This could be up, down, north, south, in some diagonal—it all depends on the direction of the camera.

Action, p. 16. That cannot be the correct interpretation because the Examiner’s interpretation renders “forward facing” superfluous.

Appeal Br. 13–14 (formatting added).

Further, the Examiner mapped *Sears*’ “camera 87” and “camera 89” to the claimed “sensor” and “digital camera,” respectively. Action, p. 7. According to the Examiner, *Sears* “discloses that the cameras may be included in a common device housing.” *Id.* (citing *Sears*, 18:15–18). But that is insufficient to meet claim element 13[a]. *Sears* is ***completely silent*** regarding the ***shape*** of the “common housing” and the positioning/location of “camera 87” and “camera 89” within the “common housing” (i.e., Examiner identified “device housing”). *Sears*, 18:15–18. In fact, *Sears* provides ***no details at all*** regarding ***the structure or geometry*** of the “common housing.” *Id.* The “common housing” is not even shown in Figure 3. *Sears*, Fig. 3. Accordingly, the Examiner ***provides no evidence*** that *Sears*’ “common housing” (i.e., Examiner identified “device housing”) has a single “forward facing portion” encompassing both “camera 87” and “camera 89” (i.e., Examiner identified “sensor” and “digital camera,” respectively), as required by claim element 13[a].

Appeal Br. 15 (emphasis added).

To the extent that the Examiner is ***relying on inherency*** to argue that the “front” of *Sears*’ “common housing” (the Examiner-identified “device housing”) consists of a single portion encompassing both “camera 87” and “camera 89” (the

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Examiner-identified “sensor” and “digital camera,” respectively), that *is improper*.

Reply Br. 8 (emphasis added).

B.1.b. Claim 13, element [a] – Panel’s Analysis

We are not persuaded by Appellant’s argument. First, claim 13 sets forth the requirements for “forward facing” as being “the forwarding facing portion encompassing a digital camera adapted to capture an image and having a field of view and encompassing a sensor adapted to detect a gesture in the digital camera field of view.” These requirements do not exclude a portable device’s forward facing portion from facing *downward*. Occhiogrosso’s Declaration (paragraphs 47–52) attempts to define “forward facing” without addressing the claim requirements for the “forward facing” portion. Although the Declaration points to embodiments in the Specification as support for “forward facing” excluding *downward*, we do not find the phrase “forward facing” in the Specification. Also, we do not find language in the Specification that precludes the Declaration’s cited embodiments at Figure 1, 2C, and 5 from involving, for example, reclining users (e.g., facing upward or downward) as opposed to standing users. Even if we were to agree with Appellant that “forward facing” excludes *downward*, it would have been obvious to modify Sears to this restrictive forward facing (i.e., horizontal direction) direction of reading the text because it is very well-known to read notices posted for reading in such a forward-facing direction (e.g., a sign or notice posted on a business’ door or window). Given the language of claim 13, we agree with the Examiner that “forward facing” would have been understood by a POSITA in the context of which direction the device itself is facing. Contrary to Appellant’s

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assertion, this does not render “forward facing” superfluous. Essentially, Appellant is asking this Panel to read the phrase “forward facing” as requiring pointing in a horizontal direction as opposed to a forward facing portion only specifying where the camera is located. Even if we agreed with Appellant, the “forward facing” limitation still would have been obvious as it merely limits claim 13 to one of the known directions of camera operation which is shown by Sears at, for example, figure 4 (items 103 and 105) and column 21, lines 8–15.

Second, we disagree that the Examiner errs because “the Examiner provides no evidence that *Sears*’ ‘common housing’ (i.e., Examiner identified ‘device housing’) has a single ‘forward facing portion’ encompassing both ‘camera 87’ and ‘camera 89’[.]” We find that Figure 3 of Sears discloses the location and positional relationship of the cameras. We agree with the Examiner that “Sears further discloses that the cameras may be included in a common device housing. Col. 18 lines 15–18.” Final Act. 6. Essentially, Appellant is arguing that the artisan is an automaton capable of only rote application of the teachings of the Sears reference. We disagree. We conclude this premise is contrary to our reviewing court’s guidance. “A person of ordinary skill is also a person of ordinary creativity, not an automaton.” *KSR Int’l Co. v. Teleflex Inc.*, [550 U.S. 398, 421](#) (2007). We determine that extension of Sears’ common housing to include both cameras in the same configuration as taught in Sears’ Figure 3 to be such ordinary creativity.

Third, contrary to Appellant’s inherency argument (Reply Br. 8), we conclude that the Examiner does not rely on inherency to reject claim 13.

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B.2.a. Claim 13, element [b] – Appellant’s Contentions

Appellant argues:

Claim element 13[b] recites, in part, a “processing unit[] adapted to: detect a gesture . . . and subsequently capture an image using the digital camera.” . . .

The Examiner contends that the corresponding structure for this alleged means-plus-function limitation is “computer 220, which may be a microprocessor” executing software that “will detect when a particular pose occurs” and send “a signal . . . to the camera control module 255 to hold the last frame, store it in memory, or transmit it.” Action, pp. 3–5 (citing ’949 Patent, 6:6–19) (emphasis added). As shown in Figure 2B, the “camera control module 255” is connected to both “computer 220” and “cameras 202, 210, 211.” ’949 Patent, Fig. 2B. *Sears* does not teach a “camera control module.” Accordingly, *Sears* does not teach a “computer” or “microprocessor” (e.g., “main system 35”) that sends a signal to the non-existent “camera control module.” Thus, even if the Examiner-identified corresponding structure were proper, *Sears* does not teach this corresponding structure. Further, the Examiner provides no evidence that *Sears* discloses an equivalent of the identified corresponding structure.

Appeal Br. 18–20.

Appellant also argues:

Further, claim element 13[b] recites, in part, “detect a gesture has been performed . . . and correlate the gesture detected by the sensor with an image capture function and subsequently capture an image.” Accordingly, the image capture function must be triggered by detection of a gesture. The Examiner mapped *Sears*’ image capture and interpretation via optical character recognition (OCR) to claim element 13[b]. See Action, p. 8 (“*Sears* discloses that if a gesture command directs the system to read text, and that text has not yet been interpreted, then image capture via OCR occurs.”) (citing *Sears*, 18:33–38)

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Sears does not wait for a gesture to start capturing images. *Sears* begins capturing images “immediately, before [user] gestural input,” when text is within the field of view (e.g., “printed material 33” is moved such that text is within the field of view). [*Sears*, 18:28–35]. When a user gesture is eventually detected in *Sears*, the user gesture identifies a portion of the text within “printed material 33” to be vocalized. Because *Sears* has already captured an image with the identified portion of text, and *Sears* has already performed OCR on the image, *Sears* can begin vocalization of the identified portion of text “almost immediately” (i.e., no need to wait for image capture or OCR to be executed). *Id.*

Sears also states that “[i]f the text to be read is not among that already interpreted, then image capture 51 of the indicated text using high pixel densities suitable for OCR 55 can begin.” *Id.* at 18:35–38. But as *Sears* indicates, image capture occurs automatically, before a gesture, when text is placed within the field of view of the image capture means. *See id.* at 18:28–35. Gestures control interpretation via OCR and vocalization, not image capture. Accordingly, *Sears* fails to teach or suggest claim element 13[b], and thus fails to render claim 13 unpatentable.

Appeal Br. 20–21.

B.2. Claim 13, element [b]

B.2.b. Claim 13, element [b] – Panel’s Analysis

We are not persuaded by Appellant’s argument. First, Appellant asserts *Sears* fails to teach or suggest a “processing unit[] adapted to: detect a gesture . . . and subsequently capture an image using the digital camera.” However, without mentioning the claimed functions of detecting and capturing, Appellant’s argument asserts

Sears does not teach a “camera control module.” Accordingly, *Sears* does not teach a “computer” or “microprocessor” (e.g., “main system 35”) that sends a signal to the non-existent “camera control module.”

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Appeal Br. 19. To the extent Appellant is arguing the capture in Sears is not triggered by a processing unit, we agree with the Examiner (Final Act. 7) that this is disclosed by Sears at column 18:33–38 where the “system” operates to capture an image if it detects “the text to be read is not among that already interpreted.”

Second, Appellant asserts the primary embodiment in Sears does not wait for a gesture to start capturing images. We agree. Also, Appellant acknowledges (Appeal Br. 21, last paragraph) the Sears alternative where following a gesture command, “[i]f the text to be read is not among that already interpreted, **then image capture** 51 of the indicated text using high pixel densities suitable for OCR 55 **can begin**.” Sears 18:35–38. The Examiner determines this alternative describes the claimed “detect a gesture . . . and subsequently capture an image using the digital camera.” Appellant argues it cannot because Sears requires that image capture occurs automatically, before a gesture (i.e., Appellant argues that Sears always requires the image capture occurs automatically, before a gesture and does not permit a timing sequence of the gesture first followed by the capture). Essentially, Appellant argues that Sears places the operation sequence requirements of the Sears’ primary embodiment onto all embodiments. We disagree. Sears states “[i]t should be noted that the operation of the system with multiple cameras **could admit many different sequences** of optical character recognition (OCR) 55 and pointer tracking 57.” Sears 18:25–28 (emphasis added). We agree with Examiner that in Sears’ alternative embodiment the gestural command triggers the image capture for OCR, if

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text is not among that already interpreted. We also agree that this describes element [b] of claim 13.

C. Claim 15

Appellant raises the following arguments in contending that the Examiner erred in rejecting claim 15 under 35 U.S.C. § 103 as being unpatentable over Sears. *See* Appeal Br. 22–24.

Appellant argues:

Further, dependent claim 15 recites “wherein the detected gesture includes a pose,” whereas dependent claim 14 recites “wherein the detected gesture includes a hand motion.” Because the terms “pose” and “hand motion” are different, they have different meanings. . . . Based on the claim language alone, a “pose” is a gesture *involving at least one body part other than a hand*. This interpretation is confirmed by the specification of the ’949 Patent.

Appeal Br. 22 (citation omitted; Panel emphasis added).

Patent Owner asserted “a ‘pose’ is a gesture involving at least one body part other than a hand.” Appeal Brief, p. 22. This means a “pose” is a gesture that may include a hand so long as the gesture also includes a body part other than a hand (e.g., lips, eyes). *See, e.g.*, ’949 Patent, 10:24–30 (“the invention can be used to photograph all ‘smiling’ poses for example. Or poses where the smile is within certain boundaries of lip curvature even . . . [or] when the subject’s eyes are open a certain amount”) (emphasis added). But *a gesture consisting solely of a hand* (and thus no other body part) *is not a “pose.”*

Reply Br. 11.

We are not persuaded by Appellant’s argument. First, the Specification (5:36) states that a gesture is an example of a pose (“poses (e.g., gestures)”) and also states:

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For example the invention disclosed above, allows one to automatically observe the expressions, *gestures* and [countenance] of a person, by determining the shape of their smile, the direction of eye gaze, and the positions or *motion of parts of the body such as the* head, arms, *hands*, etc.

'949 Patent, 11:16–20 (emphasis added). However, we do not find where the Specification defines a “pose” is required to be a gesture involving at least one body part other than a hand.

Second, we do not find where Appellant cites either a reference (e.g., dictionary) or case law that actually requires their restrictive reading of “pose.” Rather, the general definition of the term “pose” (a noun) is:⁶

1. “a bodily attitude or posture.”
2. “the act or period of posing, as for a picture.”
3. “a position or attitude assumed in posing, or exhibited by a figure in a picture, sculptural work, tableau, or the like.”

These definitions do not support Appellant’s argument.

D. Claim 18

In rejecting claim 18, the Examiner determines:

Sears indicates that in “previous embodiments” such as the one relied upon herein the cameras that capture images of text and the cameras capturing gestures are in a fixed location. Col. 22 lines 1–8. See also Abowd Dec. ¶ 88.

Final Act. 11.

Sears at column 22 (cited by the Examiner) states:

⁶ Dictionary.com, <https://www.dictionary.com/browse/pose>. Definitions number 7, 9, and 10. (Accessed July 28, 2023). Based On The Random House Unabridged Dictionary, © Random House, Inc. 2023.

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In the previous embodiments of the present invention, the camera or cameras capturing the images of text to be read are either at a fixed location or located relatively distantly from the text (e.g. ***mounted on the user's head*** or chest).

Sears, 22:1–5 (emphasis added).

Appellant raises the following arguments in contending that the Examiner erred in rejecting claim 18 under 35 U.S.C. § 103 as being unpatentable over Sears. *See* Appeal Br. 24–27.

Further, dependent claim 18 recites “wherein the sensor is fixed in relation to the digital camera.” As discussed above, the Examiner mapped *Sears*’ “camera 87” and “camera 89” to the claimed “sensor” and “digital camera,” respectively. *Sears* discloses “camera 87 may be fixed in its orientation, provided that the field of view is sufficiently large to capture images from the entire printed material of interest.” *Sears*, 16:19–22 (emphasis added). In contrast, *Sears* expressly states that the orientation of “camera 89” is not fixed:

[quotation omitted].

Sears, 17:29–39 (emphasis added). Accordingly, *Sears* teaches “camera 89” (i.e., Examiner identified “digital camera”) moves along at least two axes, while “camera 87” (i.e., Examiner identified “sensor”) is fixed. Thus, “camera 87” is not fixed in relation to “camera 89.”

Appeal Br. 24–25.

[Column 22, lines 1–8,] of *Sears* refers to the physical relationship between the “text to be read” and the cameras. In the platform-based embodiment depicted in Figure 3, the cameras are located on platform 85, which is a fixed distance from the “text to be read” as a result of the legs 83 supporting the platform 85: [Sears, Figure 3 omitted]. That is why the “text to be read” is at a “fixed location” (i.e., distance) relative to the cameras. *See id.* at 22: 1–8, Fig. 3. It does not change the fact that “camera 87” is not fixed in relation to “camera 89.” *Id.* at 17:29–39.

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Appeal Br. 25–26 (emphasis and formatting added). Appellant further argues:

According to the Examiner, *Sears*

says that camera 89 can be fixed: “Instead of moving the camera 89, it is also within the spirit of the present invention to rotate one or more mirrors, while the camera 89 remains fixed in location and orientation.”

Answer, p. 10 (quoting *Sears*, 17:40–43) (emphasis added). With this clarification, the Examiner now concedes that the Examiner is relying on *Sears*’ embodiment with the “rotat[ing] one or more mirrors” to meet claim 18. But *Sears* fails to teach or suggest the positioning of the “rotat[ing] one or mirrors” and “camera 89” (the Examiner-identified “digital camera”) with respect to the “common housing” (the Examiner-identified “device housing”).

Reply Br. 12 (formatting added).

We are not persuaded by Appellant’s arguments. First, we note that the relationship of “mounted on the user’s head” of *Sears*’ column 22, lines 1–5 (as pointed to by the Examiner’s rejection), is shown at *Sears*’ Figure 4 and further described at column 21.

An example of such a worn reading machine is shown in FIG. 4, a perspective diagram of an eyeglass reading machine 100. An eyeglass frame 100 provides the basic platform for the reading machine. A wide-field camera 103 on one eyeglass earpiece provides functionality similar to that of the wide-field camera 87 of FIG. 3, and a narrower field camera 105 provides functionality similar to that of the pan-tilt camera 89.

Sears, 21:8–15. We determine that *Sears*’ “mounted on the user’s head” (*Sears*, 22:1–5) teaches an embodiment using cameras (corresponding to the claimed sensor and digital camera) in fixed relation to each other. We find

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this teaching sufficient to render obvious the cameras' fixed relationship of claim 18.

Second, Appellant challenges the Examiner's reliance, in the Answer, on the alternative embodiment (rotating mirror) of Sears to teach fixed location and orientation. However, such reliance by the Examiner is unnecessary as we conclude that cameras "mounted on the user's head" (Sears, 22:1–5) as shown in Sears at Figure 4 is sufficient to show the obviousness of claim 18.

E. No Jurisdiction

Appellant raises the following jurisdictional argument in contending that the Examiner erred in granting the reexamination request filed in November 2021 on a patent that expired in May 2020. Appeal Br. 34.

In *Oil States*, the Supreme Court explained that the "decision to *grant* a patent is a matter involving public rights—specifically, the grant of a public franchise." *Oil States Energy Servs., LLC v. Greene's Energy Grp., LLC*, 138 S. Ct. 1365, 1373 (2018) (emphasis in original). "Specifically, patents are public franchises that the Government grants to the inventors of new and useful improvements." *Id.* (internal quotation marks omitted). The Court explained that "Congress [has] significant latitude to assign [the] adjudication of public rights to entities other than Article III courts." *Id.* at 1368[, 1373]. In exercising its "significant latitude," Congress grants public franchises "subject to the qualification that the PTO has the authority to reexamine and perhaps cancel—a patent claim in an inter partes review." *Id.* at 1368, 1374 (internal quotation marks omitted). Accordingly, so long as the public franchise exists, the PTO may have jurisdiction to amend and cancel the claims of the patent (e.g., via *ex parte* reexamination).

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When a patent expires, however, *the public franchise ceases to exist* and the franchisee (e.g., the patent owner) no longer has the right to exclude others. At most, the franchisee may be entitled to collect damages from the public franchise that formerly existed through an infringement action in district court. But because the public franchise no longer exists, *the USPTO has nothing in its authority to cancel or amend*. Expiration removes the patent from the USPTO's jurisdiction and returns it to the sole jurisdiction of the Article III courts, which have exclusive authority to govern claims for damages. If this were not so, the USPTO would purport to have authority to retroactively modify a public franchise that no longer exists, in a setting where the expired public franchise does not enjoy any presumption of validity and in which amendment of claims is no longer permitted.

Appeal Br. 33–34 (emphasis added).

We are not persuaded by Appellant's argument. First, the statute authorizing reexamination does not limit the timing of a reexamination in the manner argued by Appellant. To the contrary, the statute states:

Any person *at any time* may file a request for reexamination by the Office of any claim of a patent on the basis of any prior art cited under the provisions of section 301.

35 U.S.C. § 302 (emphasis added).

Second, we disagree that Appellant has no rights under the expired patent.

It is well-established that [the Federal Circuit's] decision (and the Board's decision on remand) would have a consequence on any infringement that occurred during the life of the . . . patent. *See Genetics Inst. v. Novartis Vaccines*, 655 F.3d 1291, 1299 (Fed. Cir. 2011) (“[A]n expired patent may form the basis of an action for past damages subject to the six-year limitation under 35 U.S.C. § 286.”); *see also Keranos, LLC v. Silicon Storage Tech, Inc.*, 797 F.3d 1025, 1033 (Fed. Cir. 2015) (Although “the patentee has fewer rights to transfer when the patent has

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expired,” the owner of an expired patent can license the rights or transfer title to an expired patent.); *Mars, Inc. v. Coin Acceptors, Inc.*, [527 F.3d 1359, 1372](#) (Fed. Cir. 2008) (“Title to . . . an expired patent . . . includes more than merely the right to recover damages for past infringement.”).

Sony Corp. v. Iancu, [924 F.3d 1235, 1243 n.1](#) (Fed. Cir. 2019).

Third, our reviewing court regularly reviews Board decisions where a patent under reexamination expired prior to the Board issuing its decision. In none of these cases has the Federal Circuit found a lack of jurisdiction before the United States Patent and Trademark Office (USPTO). *See, e.g., In re Rambus, Inc.*, [753 F.3d 1253](#) (Fed. Cir. 2014) (involving appeal of an *inter partes* reexamination of expired U.S. patent 6,034,918)⁷; *see also CSB-Sys. Int’l*, [832 F.3d at 1338](#) (“[T]he ’953 patent expired during the reexamination.”).

We conclude the USPTO has jurisdiction for this reexamination so long as any right remains under the expired patent.

F. No Substantial New Question (SNQ)

Appellant raises the following SNQ argument in contending that the Examiner erred in granting this reexamination request.

F.1.

As discussed above in reference to claim element 13[a], *Sears* does not teach or suggest does not the forward facing portion of the device housing encompassing a sensor and a digital camera.

⁷ The Board noted in a related *ex parte* reexamination appeal that “[t]he ’918 patent term expired during the reexamination proceedings.” *Ex parte Rambus, Inc.*, Appeal 2010-011178, [2011 WL 121775](#), at *6 (BPAI [Jan. 12, 2011](#)).

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In other words, *Sears* does not provide the technical teachings that were missing from the art during the original prosecution of the '949 Patent. Thus, a reasonable examiner would not consider *Sears* to be important in deciding whether one or more claims of the '949 Patent are patentable, and *Sears* alone does not raise a SNQ of patentability. The order for *ex parte* reexamination should be vacated.

Appeal Br. 36.

We are not persuaded by Appellant's argument. For the reasons already set forth above in section B.1., we determine that *Sears* does provide the teachings that were missing from the art during the original prosecution of the '949 Patent, and thus, does raise a SNQ of patentability.

CONCLUSIONS

The Examiner has not erred in rejecting claims 8–18 as being unpatentable under 35 U.S.C. § 103.

We **affirm** the Examiner's rejections of claims 8–18 as being unpatentable under 35 U.S.C. § 103.

DECISION SUMMARY

In summary:

Claim(s) Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
8–18	103	Sears	8–18	
Overall Outcome			8–18	

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REQUESTS FOR EXTENSIONS OF TIME

Requests for extensions of time in this ex parte reexamination proceeding are governed by [37 C.F.R. § 1.550\(c\)](#). *See* [37 C.F.R. § 41.50\(f\)](#).

AFFIRMED

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Exhibit PAT-A

U.S. Patent No. 8,878,949 (“the ’949 patent”)



US008878949B2

(12) **United States Patent**
Pryor

(10) **Patent No.:** **US 8,878,949 B2**
(45) **Date of Patent:** ***Nov. 4, 2014**

(54) **CAMERA BASED INTERACTION AND INSTRUCTION**

(71) Applicant: **Gesture Technology Partners, LLC,**
Sylvania, OH (US)

(72) Inventor: **Timothy R. Pryor,** Sylvania, OH (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/961,452**

(22) Filed: **Aug. 7, 2013**

(65) **Prior Publication Data**

US 2014/0028855 A1 Jan. 30, 2014

Related U.S. Application Data

(63) Continuation of application No. 13/459,670, filed on Apr. 30, 2012, now Pat. No. 8,654,198, which is a continuation of application No. 12/891,480, filed on Sep. 27, 2010, now Pat. No. 8,189,053, which is a continuation of application No. 11/376,158, filed on Mar. 16, 2006, now Pat. No. 7,804,530, which is a continuation of application No. 09/568,552, filed on May 11, 2000, now Pat. No. 7,015,950.

(60) Provisional application No. 60/133,671, filed on May 11, 1999.

(51) **Int. Cl.**
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G06F 3/01 (2006.01)
G06F 3/038 (2013.01)
H04N 5/222 (2006.01)

(52) **U.S. Cl.**
CPC **H04N 5/23296** (2013.01); **G06F 3/017**

(2013.01); **G06F 3/0386** (2013.01); **H04N 5/222** (2013.01); **H04N 5/232** (2013.01); **H04N 5/23219** (2013.01)

USPC **348/211.99**; **348/211.4**
(58) **Field of Classification Search**
CPC .. **H04N 5/23238**; **H04N 5/247**; **H04N 5/3415**
USPC **348/211.4**, **211.5**, **211.8**, **211.9**, **222.1**, **348/239**

See application file for complete search history.

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(Continued)

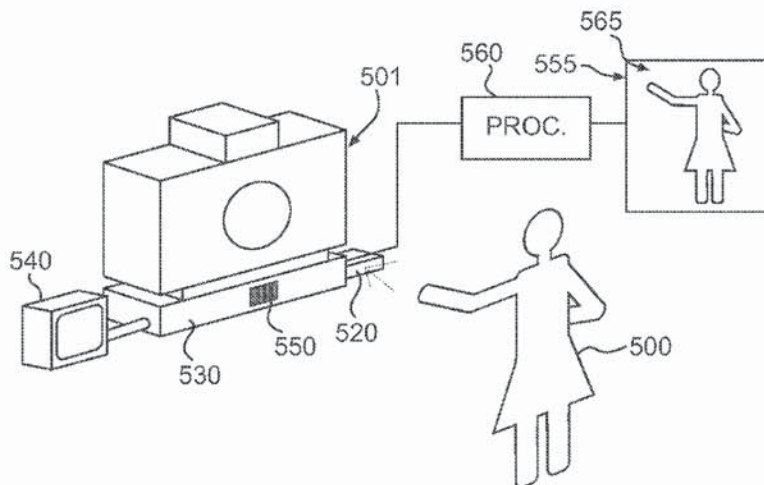
Primary Examiner — Tuan Ho

(74) *Attorney, Agent, or Firm* — Warner Norcross & Judd LLP

(57) **ABSTRACT**

Disclosed are methods and apparatus for instructing persons using computer based programs and/or remote instructors. One or more video cameras obtain images of the student or other participant. In addition images are analyzed by a computer to determine the locations or motions of one or more points on the student. This location data is fed to computer program which compares the motions to known desired movements, or alternatively provides such movement data to an instructor, typically located remotely, who can aid in analyzing student performance. The invention preferably is used with a substantially life-size display, such as a projection display can provide, in order to make the information displayed a realistic partner or instructor for the student. In addition, other applications are disclosed to sports training, dance, and remote dating.

18 Claims, 7 Drawing Sheets



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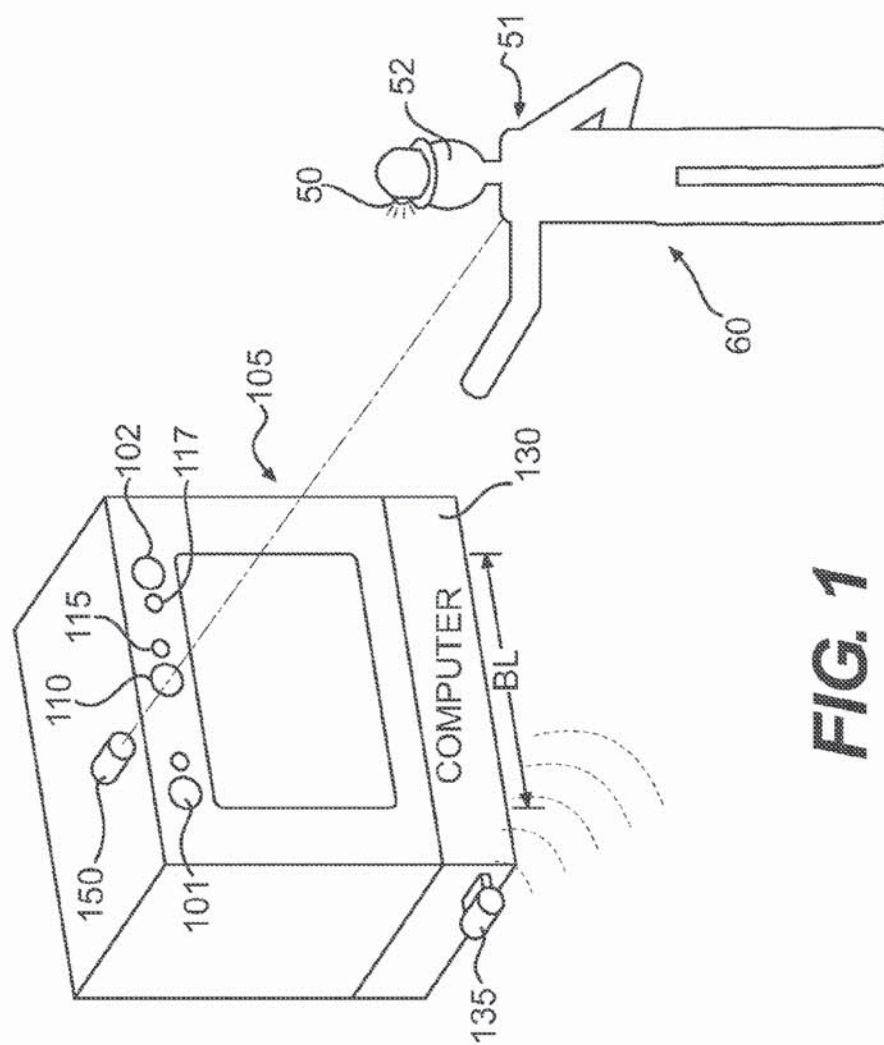
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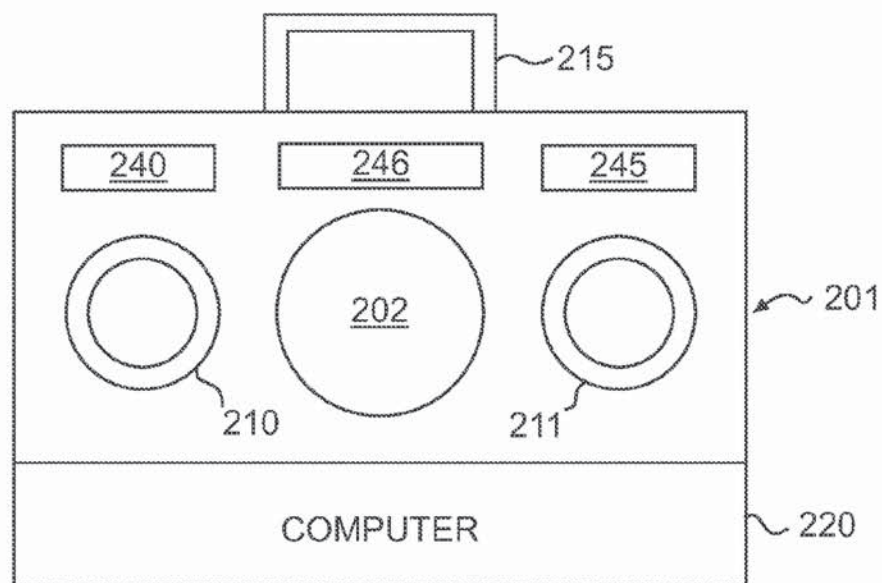


FIG. 2A

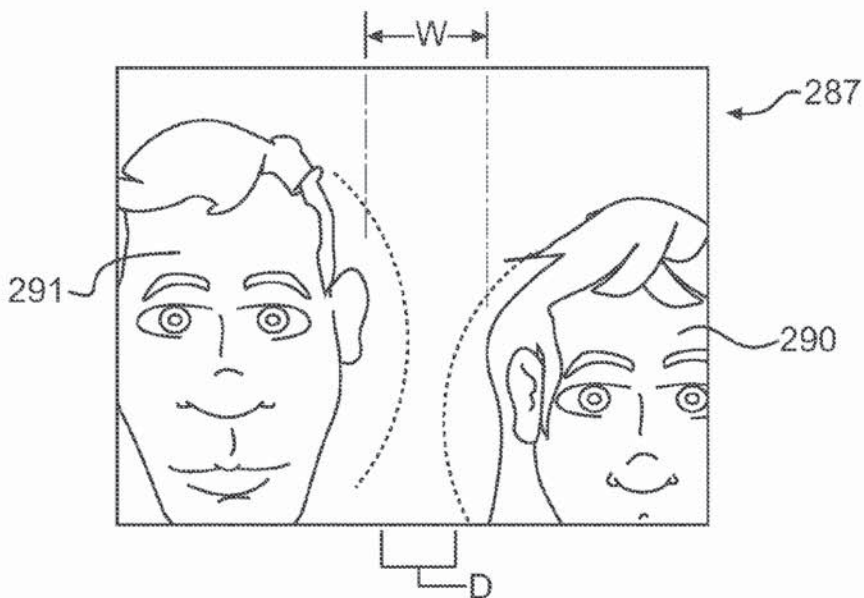


FIG. 2D

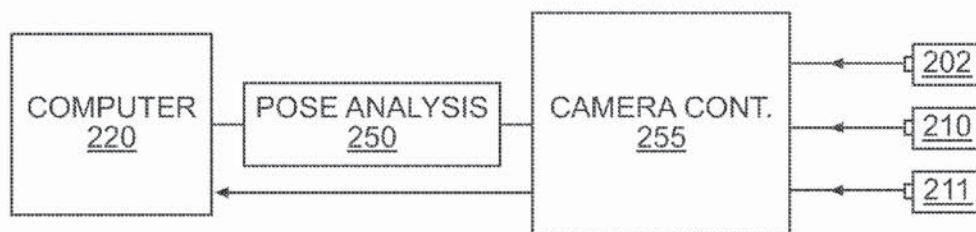


FIG. 2B

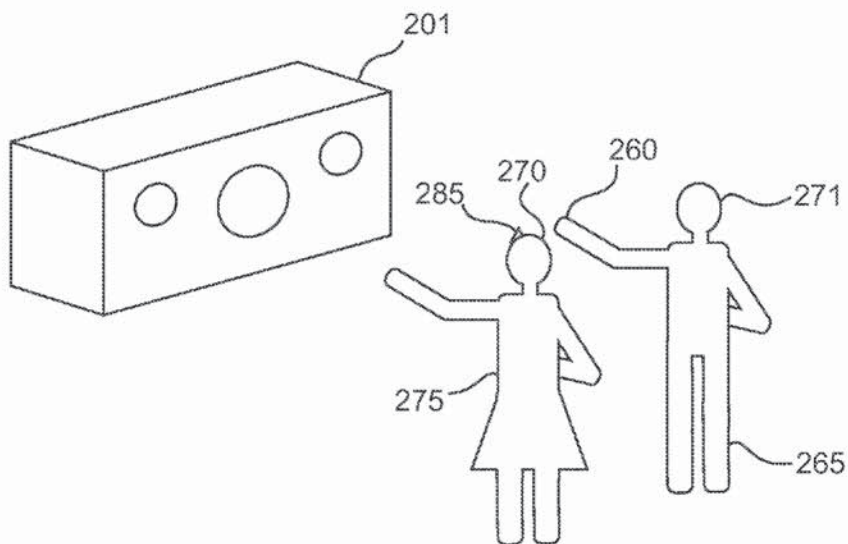


FIG. 2C

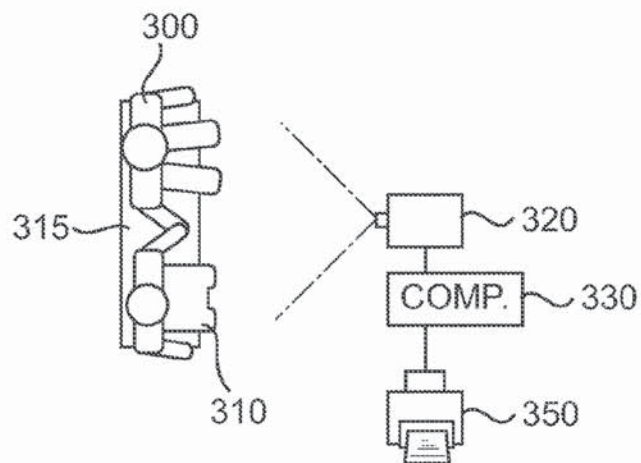


FIG. 3

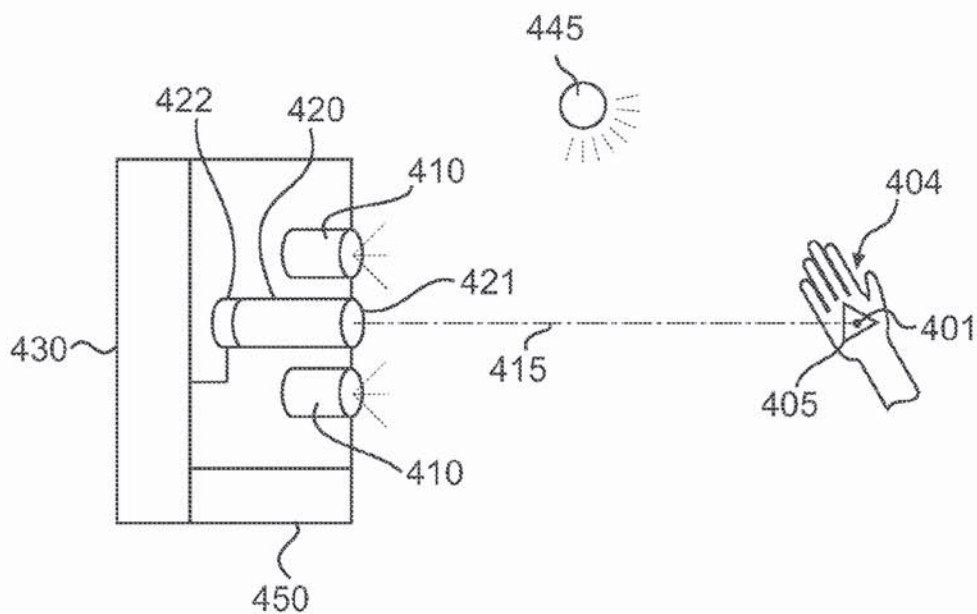
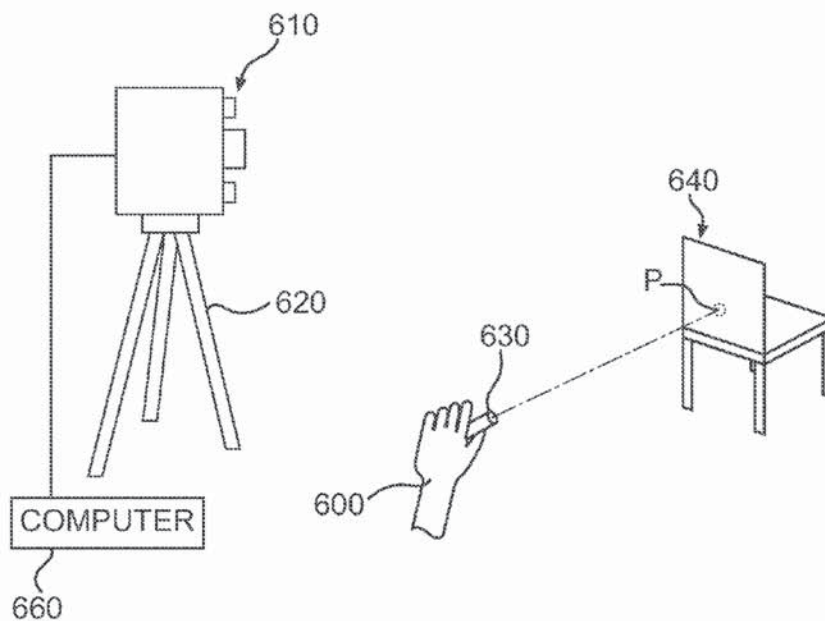
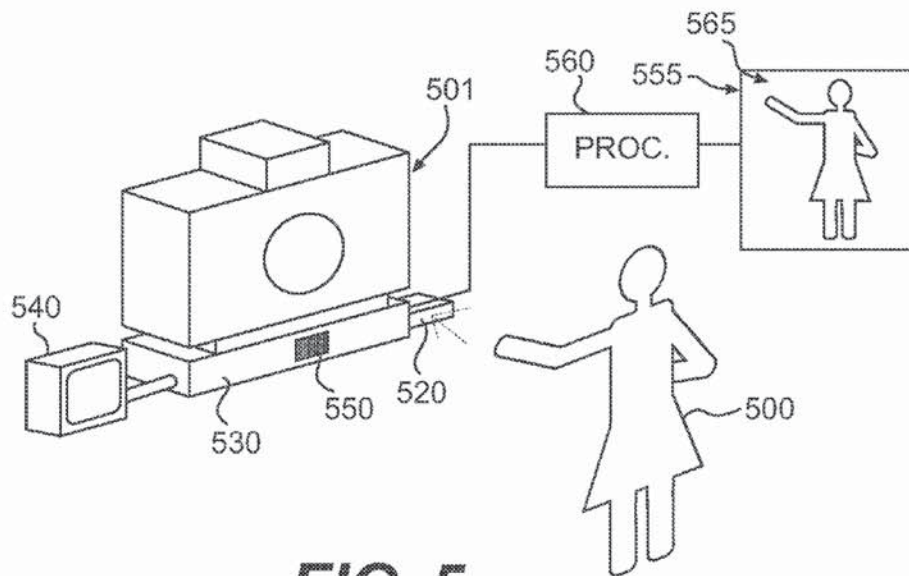


FIG. 4



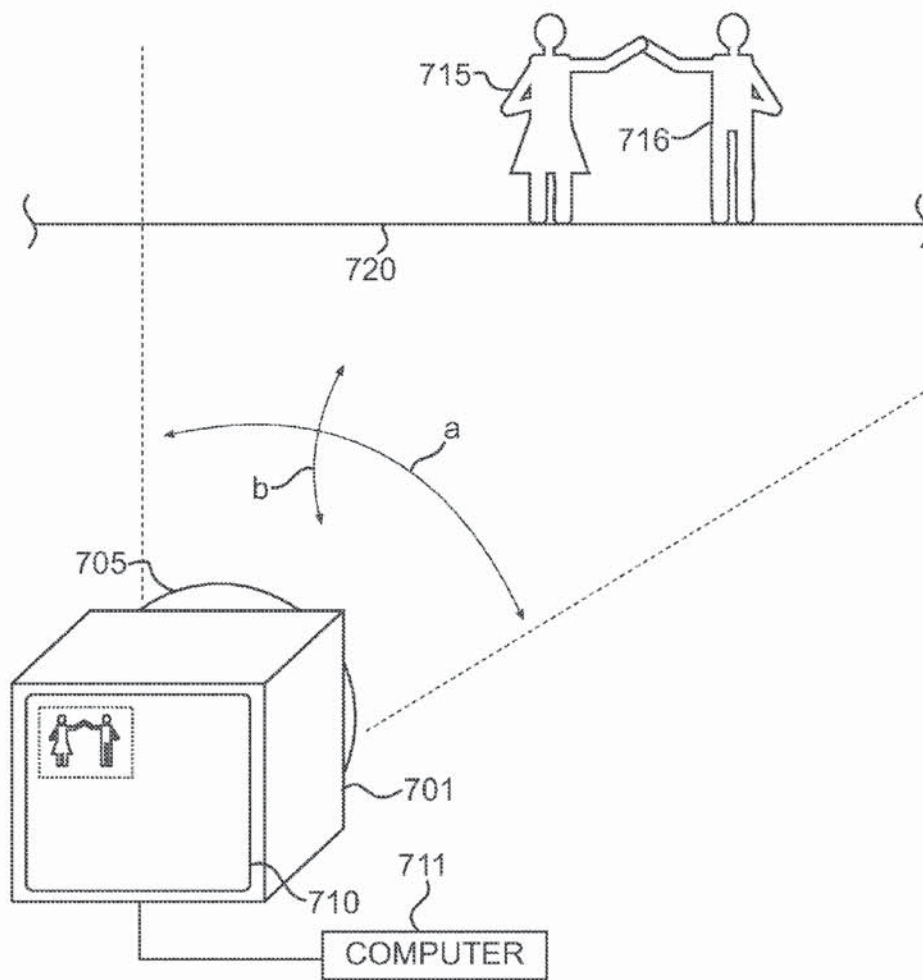
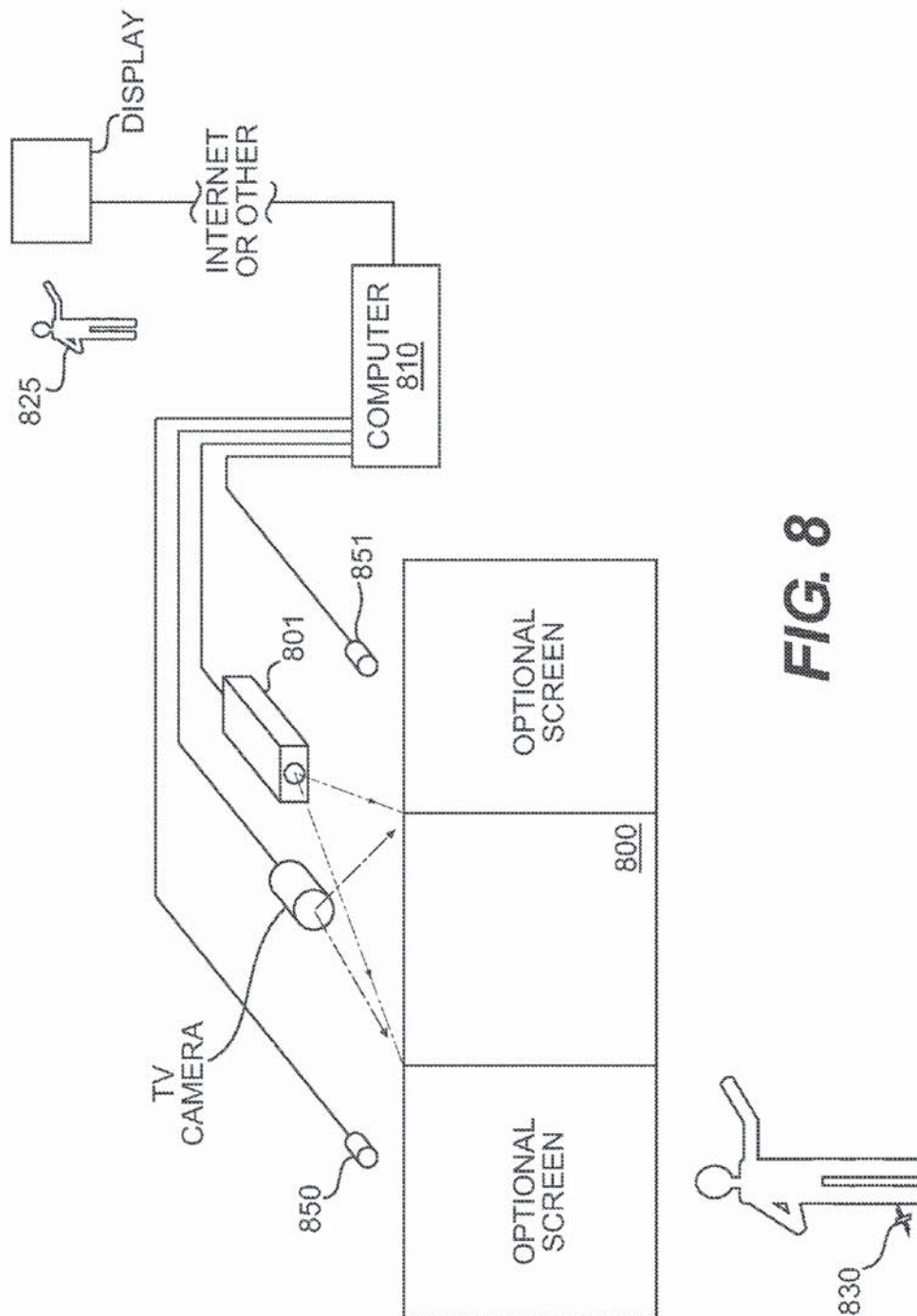


FIG. 7



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CAMERA BASED INTERACTION AND
INSTRUCTION

Method and apparatus are disclosed to enhance the quality and usefulness of picture taking for pleasure, commercial, or other business purposes. In a preferred embodiment, stereo photogrammetry is combined with digital image acquisition to acquire or store scenes and poses of interest, and/or to interact with the subject in order to provide data to or from a computer. Other preferred embodiments illustrate applications to control of display systems.

BACKGROUND

Representative of USA patents on Digital cameras are U.S. Pat. Nos. 5,534,921, 5,249,053 and many others which describe use of matrix array (CCD or otherwise) based cameras to take pictures of humans or other objects. The images taken are generally comprised of 400,000 or more pixels which are often compressed to smaller record sizes for data storage, for later retrieval and display. Video cameras or Camcorders are also increasingly able to take still photographs as well, and record or transmit them to computers.

Aside from exposure control (to keep the light reaching the detector array within the dynamic range of same), and range finding (to effect the best lens focus given the object distance in question) there are few cases known to the inventor where the camera taking the picture actually determines some variable in the picture and uses it for the process of obtaining the picture.

One such example that does not take a picture of humans but rather of data, is exemplified by U.S. Pat. No. 4,791,589, where a certain wave form signature on an oscilloscope is searched for by processing the digital camera image, and when it is seen, the image stored.

More apropos the function of "Picture Taking" as the general public knows it and of interest as the primary focus of the instant invention, is U.S. Pat. No. 5,781,650 by Lobo, et al which describes analysis after the fact of recorded images to determine facial content and thus the age of the subject. This disclosure also alludes to a potential point and shoot capability also based on the age classification of the individuals whose picture is desired.

There is no known picture taking reference based on object position and orientation with respect to the camera, or other objects that I am aware of.

SUMMARY OF THE INVENTION

High Resolution Digital still cameras employing matrix photodetector array chips to scan the image produced by the camera lens are now commonplace, and will be even more so in a few years as chips and memories become very inexpensive, and pixel density approaches 2000×2000 pixels, rivaling photographic film. Even today Camcorders having 700×500 pixel image chips are common for video based data and stills.

This invention is aimed at improvements in utilization of these cameras and others which make use of a computer based camera's ability to analyze, in real time if desired, the images obtained. Indeed a picture taking system may be composed of a combination of cameras, some used for purposes other than the recording of the picture proper.

It is a goal of the invention to provide a method for taking pictures when certain poses of objects, sequences of poses, motions of objects, or any other states or relationships of objects are represented. It is also a goal to allow this to be done in a self timer like mode, when desired scene situations or

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specific dates or other circumstances exist. In some cases, information as to what is desired may be entered remotely, even over the internet, or radio telephone.

It is also a goal of the invention to provide a method for selecting from a digital or other picture memory, pictures obtained when certain pre programmed poses of objects, sequences of poses, or relationships of objects are represented.

It is a further goal of the invention to provide means by which users engaged in digital camera based activities, or other activities, using a computer can have their pictures taken.

It is a still further goal to provide all such functions in a 2D or 3D context, and using simple equipment capable of widespread use.

It is another goal of the invention to feed back data to a subject or subjects having his or her, or their picture taken, in order that they assume another pose or engage in another activity, or juxtaposition of subject positions.

While this invention is primarily aimed at the general picture taking public at large, it is realized that commercial photographers and cine-photographers, for example in the coming trend to digital "Hollywood" movie making, may benefit greatly from the invention herein, as it potentially allows more cost effective film production by giving the director the ability to expose the camera to the presence of masses of data, but only saving or taking that data which is useful, and if desired, to signal the creation of further data based on data obtained. All this with little or no human intervention as desired, thus saving on the cost of direction, film crews, and other labor or venue related costs.

DRAWINGS DEPICTING PREFERRED
EMBODIMENTS OF THE INVENTION

FIG. 1 illustrates means by which users engaged in digital camera based activities, or other activities, using a computer can have their pictures taken.

FIGS. 2A-2D illustrate a method for taking pictures when certain pre programmed poses of objects, sequences of poses, or relationships of objects are represented.

FIG. 3 illustrates a self timer like mode, or when specific dates or other circumstances exist, including a system embodiment for taking pictures in shopping malls or other locales and providing instant print or other hardcopy capability (e.g. on a tee shirt).

FIG. 4 illustrates means to provide all such functions in a 2D or 3D context, using simple equipment capable of widespread use. Various retroreflective artificial target configurations are also disclosed.

FIG. 5 illustrates a method to feed back data to a subject having his or her picture taken, in order that the subject assumes another pose or engage in another activity.

FIG. 6 illustrates a commercial version of the invention useful for police departments and real estate agents, among others.

FIG. 7 illustrates an embodiment of the invention used for photography of stage performances.

FIG. 8 illustrates an embodiment of the invention used for ballet instruction and other teaching and interaction activities also with remotely located instructors or players.

EMBODIMENTS OF THE INVENTION

FIG. 1

Illustrated in FIG. 1 of the invention is means by which users engaged in digital camera based activities, or other

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activities, using a computer can have their pictures taken, and in this context, FIG. 1 resembles that of co-pending referenced application 9 above. A single camera, or a set, such as a stereo pair are employed to see portions of an object, such as a person, a part of a person such as a hand, leg, foot, fingers, or head, and/or to view datums on an object, portion of an object, or an object held by the person or with which the person interacts. In addition, multiple persons and objects can be seen.

Where a single camera is employed, 2D measurements of object location relative to the camera (x and y perpendicular to the camera axis) are all that is possible, unless datums of known shape or spacing are used on the object viewed. Where a stereo pair or more of cameras are employed, 3D (xyz) data of a single point can be provided, for example retro-reflector 50 on the head 52 of person 51. In both cases where 3 or more datums are used on an object, 6 Degree of freedom data can be obtained, allowing object orientation in 3 angular axes as well as range in 3 axes to be obtained. With two or more cameras, such 3D data may also be obtained using other features of objects such as edges of arms and the likely using known photogrammetric techniques.

The cameras used may also be used to take pictures of an object, or another specialized camera used for that purpose in conjunction with those used to determine the location of object features. Both examples are illustrated in this application.

As shown in this figure, two cameras 101 and 102 are used as a stereo pair, with each camera located at opposite sides of a TV monitor 105, used for either computer or Television display or both. This is a desirable configuration commercially and discussed the co-pending application references above. In this particular case, an additional camera 110 is shown in the middle of the other two, said added camera used for picture taking, internet telephony and/or other purposes. An optional auxiliary LED light source 115 (or 116 or 117) for illuminating a user 60 or other object is also shown.

All three cameras are connected to the computer 130 by means of a USB (Universal Serial Bus) daisy chain, or IEEE 1394 firewire connections (faster). Each is accessed, as needed for position and orientation determination, or picture taking.

Even using a single camera in two dimensions (as is normal today), some position and orientation data or sequences of same can be achieved using modern image processing techniques. (See for example the invention disclosed in U.S. Pat. No. 4,843,568 of Myron Krueger). However, accurate sensing and control of systems, such as cameras herein is difficult today with processors cost effective enough to be used by the public at large, and artificial target augmentation of image points is often desirable.

It is thus possible using the invention to be taking pictures of users of interactive computer systems for whatever purpose. This allows one to automatically capture images of children at play, for example with a computer system such as a computer game. It also enables many other functions which are described below. And it can be used in the field, where the computer, stereo position sensing and picture taking camera, may be co-located together in the same housing.

It is noted that where retro-reflectors are used, (as opposed to choosing for example less contrasting datums, for example natural object features such as edges of fingers, or clothing features, or targets such as colored dots) then each of the two cameras for stereo location determination needs lights to illuminate retro-reflectors substantially co-located with the camera axes. These lights can alternatively provide general

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lighting for any other camera or cameras to use in taking photographs or other purposes.

It is noted that cameras 101 and 102 need not have the image of the retro-reflector or other discernable target be in precise focus, indeed it is often helpful to have a some blur due to defocusing so as to aid sub pixel position solution of datum location. If the LEDs or other light sources are in the near infrared, and the camera lenses are focused in the visible, this occurs naturally, unless the lens is also near infrared chromatic corrected.

An optional laser pointer (or other suitable illumination source), comprised of diode laser and collimating optics 150 is also usable with the invention to illuminate object portions from which 3D data is desired (such as the neck region of person 51 as shown), or in the simpler case to designate which areas of a picture are to be focused, or zoomed in on or transmitted or recorded—with or without consideration of 3-D position data of the object. This can be fixed as shown, or optionally hand held by the user, for example in left hand (dotted lines) and used by him or her to designate the point to be measured in 3D location. (see also references above). In addition a person taking pictures, such as a photography can without looking through the viewfinder of the camera, point to appoint on the subject, which is then dealt with by camera typically by focusing the lens system such that the point is in the desired state of focus (usually but not necessarily when the laser spot on the subject appears smallest in diameter and/or of highest contrast). Such as system is particularly useful for cameras with wide fields of view, or those mounted on pan tilt mechanisms, where the mechanism can also be activated to position the camera axis to take the picture with the laser spot for example centered in the camera field.

In the laser designated case, it is generally the laser spot or other indication on the surface that is imaged, (although one can also instruct, for example using voice recognition software in computer 130 inputted via voice activated microphone 135, the camera processor to obtain and store if desired the image of the area around the spot projected onto the object as well or alternatively), and if the spot is desired, it is often useful that cameras 101 and 102 have band-pass filters which pass the laser wavelength, and any led illumination wavelengths used for retro-reflector illumination for example, but block other wavelengths to the extent possible at low cost. It is noted that the discrimination in an image can also be made on color grounds—i.e. with red diode lasers and red LEDs, the system can analyze the image areas containing reds in the image, for example—with the knowledge that the answer can't lie at any shorter wavelengths (e.g. green, yellow, blue).

By using two cameras 101 and 102, a superior ranging system for the laser spot location on the subject results, since the baseline distance "BL" separating the cameras for triangulation based ranging purposes can be sufficient to provide accurate measurement of distance to the object.

FIGS. 2A-2D

As we begin to consider the apparatus of FIG. 1, it is clear one could do much more to enhance picture taking ability than hereto fore described and contained in the prior art. And it can be done with apparatus capable of field use.

FIGS. 2A-2D for example, illustrates a method for taking pictures when certain pre programmed or otherwise desired poses of objects, sequences of poses, or relationships of objects are represented. No such ability is available to photographers today.

Consider still camera system 201, patterned after that of FIG. 1 and comprising 3 cameras and associated image scan-

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ning chips. The central camera, **202**, is for picture taking and has high resolution and color accuracy. The two cameras on either side, **210** and **211**, may be lower resolution (allowing lower cost, and higher frame rate, as they have less pixels to scan in a given frame time), with little or no accurate color capability, as they are used to simply see object positions or special datum positions on objects (which may be distinguished however by taught colors for example as taught in some of my co-pending inventions).

Cost wise the distinction between cameras is important. Today low cost CMOS chips and lenses capable of the providing stereo measurements as described above are \$15 or less. High quality CCD color detector arrays and lenses for high quality photo images are over \$100, and in many cases \$1000 or more.

An optical viewfinder **215** is one of many ways to indicate to the user what scene information is being gathered by the camera system. The user can in this invention specify with a viewfinder based readout, the area of the field that is desired. Use of the viewfinder in this manner, whether looked through or displayed on a screen, is for example an alternative to designating an area on the actual object using a laser pointer for the purpose.

The camera system **201** further contains a computer **220** which processes the data from cameras **210** and **211** to get various position and/or orientation data concerning a person (or other object, or persons plural, etc). Integral light sources as described in FIG. 1 above may also be provided such as LED arrays **240** and **245** and xenon flash **246**.

In general, one can use the system to automatically "shoot" pictures for example, when any or all of the following occur, as determined by the position and orientation determining system of the camera of the invention:

1. Subject in a certain pose.
2. Subject in a sequence of poses.
3. Portion of Subject in a sequence of poses (e.g. gestures).
4. Subject or portion(s) in a specific location or orientation.
5. Subject in position relative to another object or person.

For example, this could be bride and groom kissing in a wedding, boy with respect to cake on birthday, and sports events sequences of every description (where the camera can even track the object datums in the field and if desired adjust shutter speed based on relative velocity of camera to subject).

6. Ditto all of above with respect to both persons in certain poses or gesture situations.

7. When a subject undertakes a particular signal comprising a position or gesture—i.e. a silent command to take the picture (this could be programmed, for example, to correspond to raising one's right hand).

In addition it is noted that the invention acts as a rangefinder, finding range to the subject, and even to other subjects around the subject, or to all parts of interest on an extensive subject. This allows a desired lens focus to be set based on any or all of this data, as desired. It also allows a sequence of pictures to be taken of different objects or object portions, at different focal depths, or focus positions. The same holds true for exposure of these locations as well.

It is also possible to use the above criteria for other purposes, such as determining what to record (beyond the recording that is implicit in taking pictures), or in determining what to transmit. The latter is important vis a vis internet activity, where available internet communication bandwidth limits what can be transmitted (at least today). In this case video telephony with the invention comprehends obtaining only those images you really care about in real time. So instead of transmitting low resolution image data at 20 frames a second, you can transmit say 5 (albeit asynchronously gathered)

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frames of high resolution preferred data. (This doesn't solve flicker problems, but it does mean that poor quality or extraneous material isn't sent!). Criteria such as degree of image motion blur or image focus can also be used in making transmission decisions.

FIG. 2B illustrates a block diagram showing a pose analysis software or hardware module **250** analyzing processed image data (for example utilizing camera image data processed by visionbloks software from Integral Vision Corp.) from the computer **220** (which may be the same physical microprocessor, such as a Intel Pentium 2 in a Dell inspiron 3500 laptop computer, or different) and determining from same when a certain pose for example has been seen. When this occurs, a signal is sent to the camera control module **255** to hold the last frame taken by camera **202**, and to display it to the photographer, digitally store it, or transmit it—to someone else, or another data store or display. Such transmission can be by data link, internet, cell phone, or any other suitable means.

Another criteria could be that two or more preselected poses were seen one after the other, with a time delay between them, also pre-selected if desired.

FIG. 2C illustrates a specific case whereby a point on one person, say hand **260** of man **265** having head **271**, is determined, and a picture is taken by camera system **201** of the invention when this point comes within a distance of approximately 6 inches (or any other desired amount including contact—i.e. zero distance) from another person or object, say the head **270** of woman **275**. To obtain the data, one can look for hand or head indications in the image using known machine vision techniques, and/or in a more simple case put a target marker such as colored triangle **285** or other type on the hand or head or both and look for it.

The use of the natural features of the subjects heads, which are distinguishable by shape and size in a known field containing two persons, is now illustrated. For example, image morphology or template matching in the image field of the solid state TV camera **202** can be used to distinguish the head shapes from background data and data concerning the rest of the features such as hands, etc. of subjects **265** and **275** (or conversely hand shapes if desired can be found and heads excluded, or the hand of the right person, versus the head of the left, and so forth).

As shown in FIG. 2D, when the image field **287** of camera **202** after processing contains the two head images, **290** and **291**, spaced a distance "W". When W is not within a tolerance D, the picture is not taken; whereas if the heads are close enough, within D as illustrated in dotted lines, the picture is taken.

Criteria as mentioned can include proximity of other parts of the body, or objects associated with the subjects (which themselves can be objects). In addition, the motion or relative motion of objects can be the criteria. For example, one could take program the device to take the picture when on two successive frames the condition shown in FIG. 2D exists where the heads are apart in frame **1**, but closer in frame **2** (probably corresponding to a movement say of the boy to kiss the girl). Clearly other sequences are possible as well, such as movement taking place in several frames followed by a sequence of frames in which no movement occurs. Other means to determine motion in front of the camera can also be used in this context, such as ultrasonic sensors.

It is also noted that the actual position or movement desired can be "Taught" to the computer **220** of the picture taking system. For example, a boy and girl in a wedding could approach each other and kiss beforehand. The sequence of frames of this activity (a "gesture" of sorts by both parties) is

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recorded, and the speed of approach, the head positions and any other pertinent data determined. When the photographer thinks the picture is right, the computer of the camera system is instructed to take the picture—for example it could be at the instant when after a suitable approach, two head images become joined into one—easily recognizable with machine vision processing software under uniform background conditions. Then in the future, when such a condition is reached in the camera field of view, pictures are taken and stored, or transmitted. This allows a camera to free run whose image field for example takes in the head table at a wedding party, taking only the shots thought to be of most interest. Numerous conditions might be programmed in, or taught in—another at the same party, would be anyone at the head table proposing a toast to the bride and groom, with arm and glass raised. If video is taken, it might be taken from the point at which the arm rises, until after it comes down. Or with suitable voice recognition, when certain toast type words are heard, for example.

Application to “3-D” Pictures

Where it is desired to take “3-D” pictures, it can be appreciated that each camera, **210** and **211** can take images of the scene in place of camera **202**, and that both cameras **210** and **211** outputs can be stored for later presentation in a 3D viewing context, using known display techniques with appropriate polarized glasses or switchable LCD goggles for example. In this case the camera outputs can serve double duty if desired, each both recording picture data, as well as determining position of one or more points on the object or objects desired.

In addition, or alternatively, one can use in this 3D picture case, the camera **202** (or even a stereo camera pair in place of **202**) as a means for determining position and orientation independently from the stereo picture taking cameras.

If not used for immediate position information, camera **202** does not have to be digital and could employ film or other media to record information.

FIG. 3

In a manner resembling that of FIGS. 2A-2D above, the invention can also serve to aid a person to take his or her own picture—a modern “Self timer” if you will. For example any or all of the criteria such as the items 1-7 above, can be used as criteria for the picture to be taken of oneself. This is in addition to other more normal things like taking pictures after a certain time, or on a certain date or time interval, etc. This has particular appeal for taking pictures of one’s self, or in any other situation where the photographer is not present (e.g. unattended recording of animals, children, etc.). Similarly, a hand signal or other signal to the camera can be used to trigger the picture to be taken, using the computer camera combination to determine the hand position or movement. This can also be done by voice using microphone input and suitable voice recognition software in the computer.

Today, in a conventional context, one can as a photographer, choose to shoot a fashion model or other subject, and when you see a pose you like record the picture. But as one’s own photographer, this is much more difficult, unless you stream in video and search through the poses after the fact. But even then, you don’t know that the poses were what was desired, as no feedback exists during the shoot.

With the invention, you may program the system to take only those poses which you think you want to get. And it can instruct the subject, when a picture is taken (and the lack thereof indicating to do something different to obtain the

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desired effect resulting in a picture). The effect desired can be changed in midstream to adjust for changing wants as well, by changing the program of the computer (which could be done using hardware switches, inserting a disc, or otherwise entered as a command). In addition, as mentioned above, the gesture or pose desired, can be taught to the system, by first photographing a variety of acceptable positions or sequences, and putting bounds on how close to these will be accepted for photographing.

A specialized case is shown in FIG. 3, for self taking instant picture or printout device for use in a shopping mall Kiosk or other venue. In this case two sweethearts **300** and **310** are on a bench **315** in front of the digital or other camera **320**. When the computer **330** detects from processing the image (or images) of the invention that their faces are in close proximity (for example using the centroid of mass of their head as the position indicator, or even facial features such as described in the Lobo et al patent reference), the computer then instructs the camera to record the picture. A push button or other selector on the device allows the subjects to select what criteria they want—for example when their heads are together for 5 seconds or more, or not together, or hands held, or whatever. Or when their faces are within a certain distance criteria, such as one inch.

Alternatively, camera **320** may be a video camera and recorder which streams in hundreds or even thousands of frames of image data, and the selection of a group is made automatically by the invention in rapid fashion afterwards, with the subjects selecting their prints from the pre-selected (or taught as above) images as desired. Or the machine itself can make the final selection from the group, sort of as a random slot machine for pictures so to speak, and print the picture using inkjet printer **350** for example. Such a situation could be provided at less cost for example, with an incentive to add in your own criteria for an extra cost, and get pictures to choose from more along the lines desired. Note that in addition to, or instead of prints, they could have magnetic or other machine readable media to take home too.

FIG. 4

FIG. 4 illustrates means to provide all such functions in a 2D or 3D context, using simple equipment capable of widespread use.

For example, the simplest case is to use the same single camera such as **110**, to both take the picture, and to determine location, according to the invention, of one or more points on the object or objects for purposes of controlling the picture taking, recording, or transmission process in some way.

As has been disclosed in the aforementioned referenced co-pending applications, one can view using the single camera, one or more such points in two dimensions, or in three dimensions under certain conditions when spaced points on the object have known spacing between them on the surface of the object.

Identifying points from raw images is processing intensive, as is determination movement gestures of such images, such as an image of an arm or hand in a varying clothing and background situations. But determining the location or movement of one or more artificial targets such as a colored retro-reflector is easy, accurate and fast, based on brightness (under substantially coaxial illumination) and color—and possibly shape as well if the target is of some distinguishable shape.

For example, consider retro-reflector (e.g. glass bead Scotchlight 7615 tape by 3M company) **401**, on the hand of a subject **404**, the retro-reflector having a red reflection filter **405** matched to the wavelength of the LEDs **410** used with

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(and angularly positioned on or near the axis 415 of) camera 420 comprising lens 421 and detector array 422 used to take the picture of the object desired. When it is desired to determine the position of the hand 404, the red LED's are turned on by camera controller 430, and a bright reflection is seen in the image at the point in question due to the retro-reflection effect.

Where stereo pairs of cameras are used, as in FIG. 1 or 2A, two reflections are seen whose disparity in location from one camera to the other gives the z distance (range direction) from the camera. In this case light sources are located with each camera of the stereo pair in order that for each camera, the retro-reflectors are properly illuminated with light emanating from point or points angularly near the camera in question.

The LEDs can be illuminated on alternate camera frames, or at any other time when "picture" type image data is not desired. In this case the camera does not under room lights 445 say, normally see the retro-reflection signal, which is desirable as the bright spot of 401 from the image of the human desired. Processor 450 processing the data, can even be used to subtract out from the recorded image, the shape of the retro-reflector, which might be a noticeably different shape than found in practice (e.g. a triangle). The image can be filled in where the subtraction occurred with color, brightness, contrast and texture or other characteristics of the surroundings. This is particularly easy if the target (retro-reflector or otherwise) is placed on the human or object in a region of small variation in characteristics needed to be filled in, e.g. the back of one's hand, say. The key is that after processing, the image look like it did without addition of the artificial target.

If the LEDs are turned on by the camera controller during picture taking, color processing can be used to remove from the stored image of the scene, any indications of bright zones at the LED wavelength used, filling in with color of the surrounding area as desired.

Clearly both processing techniques just described or others can be used. And the methods work well with stereo pairs of cameras too.

Retro-reflective or other distinguishable artificial targets can be provided in different decorative designs for wrist, back of hand, rings, forehead, hats, etc. For example, 3 targets in a heart or triangle shape, a square box of 4 targets, or a box or pyramid with line targets on its edges, and so forth.

Colored targets can be made of cloth, plastic, or the like, including Colored plaids, polka dots, etc. Or coatings or Filters or evaporated on filters may be placed in front of a target such as a plastic retroreflector in order to render it of a given color (if it wasn't made of colored material in the first place).

Decorative line outlines (also possible in retroreflective bead material) can also be used as target datums, for example down the seam of glove fingers, or shoes, or belts, dress beading, etc.

FIG. 5

FIG. 5 illustrates further one of many methods by which the invention may be used to feed back data to a subject (or subjects) having his or her picture taken, in order that the subject assume another pose or engage in another activity.

For example consider FIG. 5. A girl 500 is having her picture taken by the camera of the invention 501 (in this case a single digital camera version such as illustrated in FIG. 4), and her positions, orientations or sequences of same, including motions between points are analyzed as described above, in this case by computer 530. The computer has been pro-

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grammed to look for funny movements and positions, defined here as when the arms are in unusual positions (clearly a subjective issue, programmed as to tolerances, or taught to the system by the person in control of the situation).

The girl then poses for the camera. When the camera of the invention takes the picture according to its preprogrammed criteria (in this case, for example, defined as when her arms are over her head, and after a significant movement has occurred), it lets her know by lighting light 520 connected by wires not shown to computer 530. During the photo shoot, then she begins to learn what it is looking for (if she hasn't been already told) and does more of the same. If desired, and optional video display 540 or voice out put speaker 550, both connected to computer 530, indicate to her what is desired. This could also be a particular type of pose, e.g. "Cheese-cake" based on historic classical poses learned from photo art (note that she can also make comments for recording too, with optional microphone input not shown. As pointed out above, voice recognition software, such as IBM Via Voice" can be used to recognize commands from the subject or photographer, and cause other results).

It can be more sophisticated yet. For example, if the computer 530 and any associated software as needed may be used to analyze the model's lips and her smile. In this manner, the invention can be used to photograph all "smiling" poses for example. Or poses where the smile is within certain boundaries of lip curvature even. Similarly, the camera or cameras of the invention can be used, with suitable image analysis software to determine when the subject's eyes are open a certain amount, or facing the camera for example.

FIG. 3 above has alluded to possible use of the invention data processing to determine position and/or orientation data from recorded picture frames, after the picture is taken. A method for selecting from memory pictures obtained when certain pre programmed poses of objects sequences of poses, or relationships of objects are represented.

Selection can be according to criteria for example 1-7 above, but there are some differences. First if the data is taken normally from a single camera such as that of 202 above, 3D information is not available. This being the case, conventional 2D machine vision type image processing (e.g. "Vision Bloks" software from Integral Vision Corp.) can be used to extract object features and their locations in the images retained.

A second version alternatively could employ a single picture taking camera, but by employing 3 dot or other suitable targets on the photographed object in the camera field, could calculate 3D data related to the object (position and orientation in up to 6 axes can be so calculated by the computer of the invention using target location data in the camera image field).

A third version, records data from the camera, or in the case of the FIG. 2A device, all three cameras—all recorded for example on digital media such that the processing can be done after the fact, just as it would have been live.

Another application can be to monitor the relative change in successive pictures as seen by one or more relatively low resolution cameras and when such change is minimal, cue the high resolution camera requiring a longer exposure to become enabled. In this manner blur of the high resolution camera image is avoided. This is useful in taking pictures of children, for example. This comparison of images can be made without actually measuring distances, but rather by looking for images which are not different within an acceptance band, one to another, thus indicating the motion is largely stopped. This can be determined by subtracting one image from the other and determining the amount of pixels

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above a threshold. The more, the less the images are alike. Other techniques can be used as well, such as correlation techniques.

In some instances it is desirable to have, in taking pictures, a display such as 555, preferably (but not necessarily) life size. This display can be not only used to display the image 565 of the person whose picture is being taken, but as well can display still (or video) images called up from computer memory or other media storage such as DVD discs, and the like. One use of the displayed images is to indicate to the subject a desired pose for example. This can be done by itself, or interactively using the invention. A computer generated and rendered 3D image can also be created using suitable 3D solid modeling software (such as CAD KEY) to show an approximate pose to the model.

For example the invention disclosed above, allows one to automatically observe the expressions, gestures and contenance of a person, by determining the shape of their smile, the direction of eye gaze, and the positions or motion of parts of the body such as the head, arms, hands, etc. Analysis using pre programmed algorithms or taught sequences can then lead to a determination as to what information to display on display 555 controlled in image content by display processor 560.

As one instance, suppose computer image analysis of data from camera 501 of the invention has determined that the person 500 is not smiling enough, and is in too stationary a pose. A signal from computer 510 is provided to display processor 560 so as to display on display 555 an image of someone (perhaps the same subject at an earlier time, or a computer generated likeness of a subject) having the characteristics desired. The person looks at this display, and sees someone smiling more for example, and in one scenario, tries to mimic the smile. And so forth. Alternatively, voice generation software, such as included in IBM VIAVOICE can be used to computer generate a voice command, "Smile More" for example, rather than show a visual illustration of the effect desired.

FIG. 6

Let us now discuss some other applications of picture taking enabled by the invention. One embodiment can be used to determine location of items in a scene, for example furniture in a house, for which homicide studies or insurance fraud could be an issue (see also FIG. 1 above, as well as referenced co-pending applications).

For example, a detective (whose arm 600 is shown) arrives at a murder scene in a room, and he sets the stereo camera 610 of the invention disclosed in FIG. 2C on a tripod 620 (or other suitable location) and systematically designates, using laser pointer 630, any object desired, such as chair 640 impacted by the laser beam at point P. The camera/computer system of the invention locates the designated point takes a picture of the room, or a portion thereof, including the zone of the designated point P which stands out in the picture due to the laser spot brightness. Optionally, the stereo pair of cameras of the invention can digitize rapidly the xyz coordinates of point p, which can be superposed if desired on the image of the scene including point p itself and its immediate surroundings. This data can be processed by computer 660 as desired and either recorded or transmitted to a remote location along with the images as desired using known communication means. This work can be done outdoors, as well as inside. Numerous points to be digitized can be sensed and/or indicated, as desired.

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The same digitization procedure can be used to digitize a room for a real estate person for example, to develop a data base on a house for sale. And many other such applications exist.

Finally it should be noted that the invention solves many famous problems of picture taking, for example of children. The digital camera images of the invention can be processed for example using appropriate software such as Vision Bloks to determine if the child's eyes are open (determined for example by recognizing the eye iris in the face area), and if so to take the picture, or after the fact, to select the picture from a group. Or a signal can be given by the system to the child to "open your eyes" so to speak. To determine if the eye is open, the image can be processed for example to look for the white of the eye, or to look for red reflections from the eye. This can even be done with deep red, or near IR light sources like LEDs which do not bother the child.

Similarly, if the child (or other subject) is in motion, when you want him still, the picture can be analyzed until he is still, and then the picture taken or selected. This can be determined from comparison of successive frames, from motion blur or other characteristics of motion in the image. Or a signal as above can be given to the child to "sit still" (a famous command in picture taking annals).

FIG. 7

The invention can also be used for commercial photography and for producing motion pictures. One advantage is that very high resolution images at suitable exposure levels of critical scenes can be taken, but not too many which would overload the memory capacity of a camera system. A means to enhance this is now described.

It is noted that a camera having an ability to read individual pixels as desired, or at least to choose the lines of pixels to be read, can achieve high rates of scan if one knows apriori where to look apriori for data. Or if one say scans every 20th pixel in either direction xy of the camera, to determine where frame to frame changes are occurring (due to change in pixel brightness or color). Once change is determined one can often isolate those areas to the ones of interest. For example, even in a "Still" picture, the head often moves (similar to the lovers on the bench in the shopping mall mentioned above). Every 20th pixel, cuts the number of pixels by 400 times, and raises a normal 30 hz scan rate to over 1000 scans per second—more than needed in many cases.

When the area of interest is found, the pixels in that area are all scanned for example.

Such pixel addressing cameras can also be used for determining the position and change in position of features used to determine, and track, pose and other variables, as has also been discussed in co-pending applications, particularly Camera Based Man-Machine Interfaces U.S. Ser. No. 60/142,777, incorporated herein by reference. Of special interest is that same high resolution camera can be used to take the picture desired, while at the same time be used to find or track the object at high speed.

Such high speed tracking can be interspersed with the taking of pictures. For example if in photographing a ballet, it may be desired only to take pictures of the prima ballerina, who typically is the one, with any male dancer, that is moving the most. By determining the zone to be measured, one can sense quickly what zone should be looked at, and high resolution photographs obtained from that zone. This allows one to use a very large format camera in a fixed location (e.g. 5000x5000 pixels) to cover the image of the whole stage via suitable optics, but to only take and store the pixels in a 1000x700

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zone of interest movement, or positional or gesture interest for example, providing a 35 times increase in the frame rate needed today with such large pixel cameras. This allows their practical use, without resort to human cameramen, or pan/tilt mechanisms.

Similar logic holds for quarterbacks in a football game, who often run faster than any defense men around them and can be differentiated accordingly (along with any other issues such as uniform color, design or the like). If possible, it is desirable to have a clearly defined target, such as a retro-reflective or bright colored target on one's helmet for example. Indeed helmet color can be chosen accordingly.

This is illustrated in FIG. 7 wherein camera **701** composed of lens **705** and an addressable version of a Kodak MegaPixel detector array **710** having 4000×4000 elements and under the control of computer **711** is used to scan the image of a pair of dancers **715** and **716** on stage **720**. The field of view of the camera equal to area **ab** covers the whole stage. But the area scanned out from array **710** is confined to the region in which the dancers were last seen, which is defined as a zone **a'b'** equal to in this case 500×500 pixels. This still allows DVD type resolutions to be achieved, without pan or tilt of the camera. Similarly such techniques can be used for video conferencing, sports, and other activities as well.

It should be noted that in the above embodiments the words picture and photograph are interchangeable, as are photographing or photography and picture-taking. The camera used for same is preferably but not necessarily a solid state TV camera whose pixels are scanned serially or randomly under program command.

FIG. 8

The invention can also be used to sense positions of people for instructional purposes. Data as to a dancer's movements for example can be obtained, and appropriate images, or data or both transmitted without excessive bandwidth requirements to a remote location for comment or interaction by a trained professional. Combined with life-size screen displays this allows a life like training experience to be gained at low cost, since one professional can watch 10 students in different locations say, each trying her movements alone in the intervening moments. In addition such training can occur in the home, as if one had a private tutor or coach.

For example consider FIG. 8. A class of ballet students is practicing near a "mirror" which in this case is comprised life size digital display screen **800** illuminated from the rear by a Sharp brand projector **801** driven by computer **810**. By sliding a real mirror in an out the mirror can be a mirror, or a display. If desired, this display can be extensive, and for example using 3 projectors to cover 3 adjacent screens each 6 feet high×9 feet long for example, such that a total length of a large studio is comprised.

A master instructor **825** (possibly remotely located via the internet or other communication means) can observe the students via TV camera (or cameras). By viewing the students the instructor can make corrections via audio, or by calling up imagery which represents the appropriate moves—for example from a professional doing the same Swan Lake number. In addition, the TV cameras of the invention can monitor the actual location and movements of the student, or students, and their relationship to each other, and if desired to various markers such as **830** on the floor of the studio, placed there to assist in choreographing the piece.

In addition, if the various gesture and position monitoring aspects of the invention are utilized as described above and in co-pending applications it is possible to have the instructions

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computer generated using dancers movements as input to a computer analysis program. This is particularly useful if dance routines which are classical in nature, are being attempted, which have known best forms which can be computer modeled.

In another version, an assistant can be on the scene say working with ten students in a local studio, while the master is remote.

It is also possible with the invention to provide input image data to projector computer **810**, even from remote internet located sources, which represents other people dancing for example. These can be images of the master, or others in the class—even if all in different locations. OR the images can be those of others who have performed a particular routine in the past, for example Dance of the Sugar plum fairy in the Nutcracker. This imagery could be from the Bolshoi ballet performance of the same dance, displayed in small town ballet studio or home—to illustrate the moves required. The use of life size projection not only gives a feel to this imagery, but further allows, I have discovered, a unique experience for the performer. Namely that the person can perform "with" the troupe displayed. In some cases, in ballet for example, this sometimes can be more useful than watching one's self in the mirror (typical in ballet studios).

By using the cameras of the invention, such as stereo pair **850** and **851** to determine student positions, it is also possible to control the display in many ways. For example as the student got closer to the display, the persons in the display could appear to come closer to the student. Conversely, it might be desirable to have them move away from the student to keep a constant apparent distance between them for example. And if the student is twirling left, the figures in the ballet depicted on the screen can be caused to turn right (as they are "in the mirror" so to speak) to match the movement of the student in approximate form at least.

In addition it is often desirable for learning purposes to Control speed of music and video display to match sensed movements of pupil, or from remote master person. Use display techniques which can produce variable motion display, such as variable speed DVD disc or read data in to ram. In addition it is desirable that overlaid could be masters voice.

The invention can be advantageously used in many performing arts, not just ballet. For example, live theatre, where actors from Hamlet performances of the past can interact with those practicing. Or where instructors of Skating or Gymnastics, other activities can also interact.

Sports as well is amenable to the technique, but the size of the "studio" or gym becomes an issue. Basketball for example fits the space aspect of the projection screens and the fields of view of the invention cameras as here described.

Ability of masters remotely located, and use of copyrighted performance material of famous performers and troupes allows one to franchise the studio concept of the invention. For example each town could have a Bolshoi studio franchise of this type.

It is noted that this same arrangement can serve other purposes beyond instruction. One is the possibility of remote dating, in which sensed movement of one partner is communicated, along with voice and visual expression to the other. In addition, is possible, as disclosed in co-pending applications, to build the displays described above in the form of a touch screen in which contact of one partner with the display of the other remotely transmitted from afar can occur.

If one uses large scale touch screens with optional added sensor inputs. As would be the ballet studio example of FIG. 8 if equipped with touch screen capability, then one can provide a mechanism for marketing of people relative (i.e. life

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size) objects such as automobiles in facilities such as Auto showrooms. Thus a ballet studio for example, can be used for other purposes, not just instructional, but for selling cars for example, where the display screen is displaying new models (including ones that are figments of design imagination, and where customer input is desired as in a focus group) and where customer inputs voice and action can be detected if desired by the invention. Or in reverse, an underused car showroom can be converted—on demand—into a site which can be used for, among other things, instructional purposes in performing arts, sports and the like. This gives a reason for being to the show room that transcends selling cars, and helps attract people to the facility. If a car was displayed, on a touch screen, one could walk up to the full size display of the car, and touch the door handle, which would cause the touch screen to sense that same had occurred, and indicate to the computer to cause the display to display the door opening to expose the interior.

The invention claimed is:

1. A portable device comprising:
a device housing including a forward facing portion, the forward facing portion of the device housing encompassing an electro-optical sensor having a field of view and including a digital camera separate from the electro-optical sensor; and
a processing unit within the device housing and operatively coupled to an output of the electro-optical sensor, wherein the processing unit is adapted to:
determine a gesture has been performed in the electro-optical sensor field of view based on the electro-optical sensor output, and
control the digital camera in response to the gesture performed in the electro-optical sensor field of view, wherein the gesture corresponds to an image capture command, and wherein the image capture command causes the digital camera to store an image to memory.
2. The portable device of claim 1 wherein the determined gesture includes a hand motion.
3. The portable device of claim 1 wherein the determined gesture includes a pose.
4. The portable device of claim 1 wherein the electro-optical sensor is fixed in relation to the digital camera.
5. The portable device of claim 1 further including a forward facing light source.
6. The portable device of claim 1 wherein the electro-optical sensor defines a resolution less than a resolution defined by the digital camera.
7. The portable device of claim 1 wherein the electro-optical sensor includes at least one of a CCD detector and a CMOS detector.

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8. A computer implemented method comprising:
providing a portable device including a forward facing portion encompassing a digital camera and an electro-optical sensor, the electro-optical sensor having an output and defining a field of view;
determining, using a processing unit, a gesture has been performed in the electro-optical sensor field of view based on the electro-optical sensor output, wherein the determined gesture corresponds to an image capture command; and
capturing an image to the digital camera in response to the determined gesture corresponding to the image capture command.
9. The method according to claim 8 wherein the determined gesture includes a hand motion.
10. The method according to claim 8 wherein the determined gesture includes a pose.
11. The method according to claim 8 wherein the electro-optical sensor includes first and second sensors in fixed relation relative to the digital camera.
12. The method according to claim 8 wherein the electro-optical sensor defines a resolution less than a resolution defined by the digital camera.
13. An image capture device comprising:
a device housing including a forward facing portion, the forwarding facing portion encompassing a digital camera adapted to capture an image and having a field of view and encompassing a sensor adapted to detect a gesture in the digital camera field of view; and
a processing unit operatively coupled to the sensor and to the digital camera, wherein the processing unit is adapted to:
detect a gesture has been performed in the electro-optical sensor field of view based on an output of the electro-optical sensor, and
correlate the gesture detected by the sensor with an image capture function and subsequently capture an image using the digital camera, wherein the detected gesture is identified by the processing unit apart from a plurality of gestures.
14. The image capture device of claim 13 wherein the detected gesture includes a hand motion.
15. The image capture device of claim 13 wherein the detected gesture includes a pose.
16. The image capture device of claim 13 further including a forward facing light source.
17. The image capture device of claim 13 wherein the sensor defines a resolution less than a resolution defined by the digital camera.
18. The image capture device of claim 13 wherein the sensor is fixed in relation to the digital camera.

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